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# MUNICIPAL CIVIL SERVICE EXAMINATION PAPERS

(AUTHORIZED)

No. 1.

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65 EAST 59TH STREET

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# PREFACE.

SE Examination Papers cover the examinations of the cipal Civil Service Commission of the City of New York at have been held with any reasonable degree of frequency. They give a good idea of the nature of the questions asked, nd will, therefore, aid applicants by indicating the lines on hich preparatory study should be based. It is the intention f the publishers to revise the book from time to time, adding ew papers as occasion may require. They will be glad to ve any information in their power either in regard to text-oks needed for preparation or as to the examinations them-ves.

## Important.

n addition to the papers here given, nearly every examina-n includes a paper headed "Experience." The questions this paper are personal, relating wholly to the applicant's education, and experience; applicants will therefore save e by being prepared to answer inquiries covering the fol-ving points: Age; place of birth; where educated, with tes; previous employment, with dates; reason for leaving st position; experience in work similar to that sought; any cts tending to show fitness for the position. Handwriting marked on the "Experience" paper.

Applicants for nearly every position on the Civil Servi must show knowledge of Spelling, Writing, and E Grammar and Composition. Wherever the applicant quired to write a letter or a report, his work will be n according to the knowledge of these branches shown t Knowledge of Arithmetic is, of course, almost invari quired.

In some cases applicants are examined orally as wel paper. Sample oral examinations will be found on 95 and 99.

Technical knowledge counts for more than anything determining the candidate's rating. Experience is ge of the next importance.

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PA

Assistant Engineers, Fifth Grade
A. Highways, Parks, etc.
B. Aqueduct Commission—Water Supply
C. Bridge Engineer and Draughtsman
D. Department of Docks
E. Department of Sewers

General Inspector of Streets and Roads
Inspector of Regulating, Grading, and Paving
Superintendent of Incumbrances

Mechanical Engineer—(L. I. Water Supply)
Inspector of Water Meters and Water Consumption

Topographical Draughtsman
Ornamental Iron Draughtsman
Architectural Draughtsman

Inspector of Masonry
Inspector of Steel
Inspector of Sewer Connections

Promotion Stoker to Engineman
Stationary Engineman
Janitor—Engineer
Janitor
Steam Engineman
Pile-driving Engineman
Steam Locomobile Engineman
Marine Engineman

Building Inspector—Masonry and Carpentry
Inspector of Buildings—Iron and Steel Construction
Inspector of Plumbing, Light, and Ventilation 1

Patrolman—Police 1
Promotion to Roundsman—Police 1
Roundsman—Docks and Ferries 1
Promotion to Sergeant of Police 1
Promotion to Captain—Police 1
Doorman—Police 1
Keeper 1
Watchman 1

Fireman 1
Firemen—Engineer of Steamer 1
Assistant Foreman, Fire Department 1

Departmental Inspector 1
✓ Inspector, Bureau of Licenses, Mayor's Office 1

Weighmaster 1

Supervisor of Public Baths 1

Civil Service Examiner—Male 1
*Civil Service Examiner*—Female 1
*Character Examiner*—Civil Service
*Civil Service Examiner* for Mechanical Engineer

# AUTHORIZED CIVIL SERVICE EXAMINATION PAPERS.

## Office Boy.

### Spelling.

Attempted, perceive, separation, intrigue, superintendent, fanciful, defied, grieving, scanned, operate, parallel, profundity, reprehensible, measure, balm, reasonable, incurred, warrant, crescent, middle, facing, medicine.

### Dictation.

If their arguments do not produce conviction, I know of nothing that will have greater influence, especially when we reflect that the system referred to being the result of the collected wisdom of the continent, must be esteemed, if not perfect, certainly the least objectionable of any that could be devised; and that if it should not be carried into immediate execution, a national bankruptcy, with all its deplorable consequences, will take place.

### Arithmetic.

1. Add 189167145; 198765432; 123145167; 928374627; 728934528; 236727834; 120003429; 273849233; 128934525; 161514388; 189156164; 783672399; 928374648; 233255267; 171615143; 234567891; 127893455.

2. Multiply 9876.35 by 807.96.

3. Divide 4.81522472 by 789.64.

4. What number added to $\frac{7}{8}$ of $18\frac{3}{4}$ will equal $\frac{9}{10}$ of $14\frac{2}{3}$?

5. Two steamers started at the same time, one from Pittsburg to Cairo at the rate of $11\frac{1}{2}$ miles per hour, the other

from Cairo to Pittsburg at the rate of $9\frac{3}{10}$ miles per hour If they met in $46\frac{7}{8}$ hours, what is the distance from Pittsburg to Cairo?

6. If a man can weave one inch of rag carpet in two minutes, in how many days of nine hours each can he weave the carpet for a room 18 ft. long and 15 ft. wide?

7. If $18\frac{3}{4}$ tons of anthracite cost $\$156\frac{1}{4}$, how many tons would cost \$775?

8. Exchanged 288 shares of insurance stock at $93\frac{3}{4}$ for canal stock at $112\frac{1}{2}$. How many shares of the latter stock did I receive?

LETTER-WRITING.

*Letter No.* 1.

Write a letter of not less than 150 words, properly dated, addressed, and signed, to some fictitious friend, about the sports you are most interested in, giving reasons for your preference.

N. B.—In rating this letter, consideration will be given, not to the merit of the opinions expressed, but to the expression of the opinions, grammar, composition, etc.

*Letter No. 2—Business Letter.*

Suppose a boy comes to you seeking employment and giving John Doe as a reference. Write a letter to Mr. Doe asking information.

N. B.—Sign both the above letters with your examination number and *not* your name.

---

## Promotion to Messenger—Sewer Department.

LOCALITIES.

Manhattan and the Bronx.

1. *Locate the* following: (*a*) U. S. Barge Office; (*b*) Main *office, Department* of Parks; (*c*) New Building Appellate

Division of Supreme Court; (*d*) New York Herald Building; (*e*) Municipal Building, Bor. of Bronx.

2. Give your most direct route if you were sent on business from the City Hall to the following buildings successively, in order named, and back to the starting-point: (*a*) Fire Headquarters; (*b*) American Museum of Natural History; (*c*) Grant Monument; (*d*) Van Cortlandt Mansion in Van Cortlandt Park; (*e*) New York Catholic Protectory.

About how much time would it require, if you were not delayed at any place, and about how much carfare would be required?

3. Where do the following streets and avenues begin and end; give the general direction of each: (*a*) 8th avenue; (*b*) 14th street; (*c*) Manhattan avenue; (*d*) Boston Road; (*e*) Hudson street.

4. At what places as near as possible to Police Headquarters would you take ferries to the following places: (*a*) Long Island Railroad; (*b*) Hoboken; (*c*) College Point; (*d*) 39th street Brooklyn; (*e*) West Shore Railroad.

5. Where are the following: (*a*) Altman's Department Store; (*b*) City prison; (*c*) Cunard Line Pier; (*d*) St. Luke's Hospital; (*e*) Mutual Life Insurance Building.

6. By what steam railroad lines would you go to the following places: (*a*) Village of Inwood; (*b*) Pelham Bay Park; (*c*) Riverdale; (*d*) Fordham; (*e*) At what points do steam cars cross 125th street?

## Arithmetic.

1. Add 765849; 9767785; 867973; 436874; 976847.
2. Subtract 769848 from 920347.
3. Multiply 70984 by 6097.
4. Divide 2662548 by 4372.

## Telephone Operator—Male.

### Technical.

1. (*a*) Describe the complete organization of a large telephone office, and state the duties of each employee. (*b*) Note the number of subscribers for which such an organization would be required.

2. Describe the parts of the most recent form of telephone receiver.

3. Describe how it is that such an instrument can reproduce the sounds transmitted.

4. What troubles, if any, are likely to occur at a receiver or transmitter?

5. Describe a spring-jack and its connections with lines.

6. Describe the method of connecting two subscribers so that they can converse.

7. (*a*) How do you know that a subscriber is calling you? (*b*) Describe the apparatus and its operation.

8. Is the whole apparatus of a telephone office operated by one electrical circuit, or is it not? (In your answer state how many circuits are used, what is their character, and what each operates).

9. Give a pen sketch of a switch-board sufficient to show all its features, and indicate the office of each part.

10. Do any troubles arise at a switch-board? If so, describe them.

11. Aside from troubles at switch-board, receiver or transmitter, state what causes there are for indistinctness in transmission of telephone messages. Give this fully and clearly.

### Arithmetic.

1. Add 478964; 893788; 654976; 985879; 748399.

2. Subtract 149897 from 430274.

3. *Multiply 78095* by 6087.

4. *Divide 2082794* by 6784.

## Clerk—Male.

### Arithmetic.

1. (*a*) Add 1456789345; 9283746273; 9685748399; 1293-847362; 1987654321; 2341341457; 1761541329; 1231671895; 1817161514; 1871651433; 9685746278; 9685748399; 2343-564789; 1879677354; 1671451346.

1. (*b*) Add 12.05, .009, 6.017, .0003, and 124 together; take from the sum 41.0838; divide the remainder by 99.5; and multiply the quotient by 8.07.

2. Add $\frac{7\frac{1}{3}}{8\frac{1}{5}}$, $\frac{11\frac{1}{3}}{12\frac{3}{4}}$, $\frac{7\frac{1}{2}}{12\frac{4}{7}}$, and $\frac{4\frac{1}{4}}{11\frac{3}{5}}$.

3. (*a*) 3.31 gals. 2 qts. is what decimal part of 65 gals. 2 qts. 1 pt.?

3. (*b*) A bankrupt's assets are $16800, his liabilities are $55000, and the expenses of settlement are $2500; how much will he pay on the dollar?

4. What sum must I pay for a house, so that after spending $50 for repairs I can gain 5% by selling for $4830?

A and B were to receive $152.10 for removing a bank of earth. A furnished 10 carts 8 days; and B, 12 carts 6 days. How much should each receive?

6. A note for $940, dated January 23, payable in 3 months, was discounted in bank March 30, at 5%; what was the discount?

7. Find the compound interest of $250 for 2 years, at 6%, payable semi-annually.

### Letter-writing.

Write a letter of not less than 300 words, properly dated, addressed and signed, to some fictitious friend, on the question whether professional baseball tends to degrade or elevate other sports.

### Spelling.

Colleague, martyrdom, intensified, furious, supplement, concurrence, relinquish, intriguing, reverberate, unballasted, malign, virtuous, facilitate, vengeance, scintillate, subsidies, disciples, fissure, handiwork, inconceivable, amendment.

---

### Promotion to Asst. Clerk—Magistrate's Court.

1. (*a*) Describe fully the duties of the position for which you are applying; (*b*) Describe in detail the routine daily duties of the position you now hold; (*c*) Explain wherein you think the duties of your present position tend to qualify you for the position which you seek.

2 and 3. Draw complaints to fit the following cases, supplying from your imagination such details as may be necessary. Draw complaint in full in case (*a*) and show what you would insert in each of the other cases: (*a*) For giving knockout drops; (*b*) For taking money from the person; (*c*) For slashing with a razor; (*d*) For non-support; (*e*) For running a pool-room, defendant unknown.

4. Draw a warrant in full for case (*a*) mentioned above, and show what you would insert in each of the other cases.

5. Draw specimens of the following, assuming such details as you please: (*a*) Commitment for examination, pending adjournment; (*b*) Commitment on conviction of vagrancy; (*c*) Bail bond in a bribery case.

6. Assume three distinct and differing violations of the excise law, by John Jones and James Smith, proprietors, and Richard Brown, bartender. Jones and Smith plead "not guilty." Jones has a hearing and is acquitted. Smith *waives examination* and is admitted to bail. Brown pleads "*guilty*" *and is fined* and pays his fine. Supposing such

other details as you may need, draw all the papers with all endorsements necesary in all three instances from the time the prisoners are brought into court until the prisoners are finally disposed of by the Magistrate.

7. (*a*) Give the name and location, describe the composition and administration, and define the jurisdiction, territorily and otherwise, of all the courts of criminal jurisdiction (exclusive of Magistrates' Courts) in New York City. (*b*) Define the following as used in the Code of Criminal Procedure: Magistrate; oath; peace officer; signature; information.

8. (*a*) Describe in detail the pay-roll of a Magistrate's Court. (*b*) Draw a brief specimen calendar for a Magistrate's Court. (*c*) Describe fully the books and records kept in a Magistrate's Court. (*d*) Suggest any improvement in the method of keeping the same or any desirable additions thereto.

9. The statistical history of crime in this city is much more imperfect than in most European capitals. Suggest in detail some scheme of co-operation between the various branches or departments of the government charged with the enforcement of the Criminal Law within this municipality, whereby a perfect record might be somewhere kept of every case.

10. Write a letter of not less than 200 words, properly dated, addressed and signed (with your examination number and *not* your name), to some member of the Board of Estimate and Apportionment, giving your views, as based on your experience, of the desirability of establishing the proposed "Children's Court."

## Promotion to Fourth-grade Clerk. Education and Finance.

ARITHMETIC.

1. Add 1789654762; 1987854999; 1236743267; 1237823676 1278346232; 1654783293; 98754327; 987456; 899; 87654325. 83454; 176543289; 1985467233; 1986543289; 7658493455; 2367283427; 2673425634; 2356784568.

2. 20 12-25 times 4 7-8 equals what? Give your answer in decimal fractions.

3. Smith sold Jones a farm and gained .15 of the cost. Jones sold it to Brown at a gain of .12 on what it cost him. Brown sold it to Robinson for $1,449, which was a loss of .1 of what he paid for it. What did the farm cost Smith?

4. What number — 18¾% of itself equals 425.1?

5. A commission merchant sold a consignment of tobacco for $1,957, on a commission of 5%. He invested the net proceeds in grain, after keeping his commission of 3% for buying. What was his commission for buying the grain?

6. A wholesale newsdealer bought 80 magazines at 25 cents each; 150 illustrated weeklies at 8⅓ cents each; 850 dailies at 5 cents each; 120 novellettes at 17½ cents each, and 50 cloth volumes at 58 cents. What was the average cost of each?

7. Insured a boat for ⅔ of its value, at 1¾%, paying $31.50 premium, and the cargo for ⅘ of its value, at 1⅝%, at a premium of $40.95. Find combined value of boat and cargo.

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## Clerks and Assistant Clerks in the Civil District Courts.

1. Give the substance of the provision of the code which gives jurisdiction to the District Courts of the City of New *York and the limitations* of that jurisdiction.

2. (*a*) How many judicial districts are there in New York City as at present constituted? (*b*) Give the location of the Court House in each district.

3. (*a*) What is the general rule as to the particular district in which an action must be brought? (*b*) Are there any exceptions to this rule; if so, what?

4. (*a*) What is the usual time within which a summons is returnable and what exception is there to this rule, if any? (*b*) By whom may a summons be served? Give the various cases. (*c*) Draft an affidavit of service of a summons by a marshal.

5. (*a*) In what cases may an order of arrest issue from a District Court? (*b*) What preliminaries are necessary to the issue of an order of arrest?

6. In what cases is security for costs required from a party plaintiff?

7. (*a*) In what cases will a commission issue to examine a witness in the State of Connecticut? (*b*) When may an oral commission issue? (*c*) How must the notary or other commissioner taking the deposition execute and return it? (*d*) Specify wherein the following certificate is defective if at all:

State of Connecticut;
County of New Haven: SS:

I, HENRY K. JONES, do hereby certify that William F. Smith, the witness, personally appeared before me on the Fifth day of October, 1897, at eleven o'clock in the forenoon, at my office No. 37 Church Street in the City of New Haven, in said County, and did depose to the matters contained in the foregoing deposition; and I further certify that I have subscribed my name to each half sheet thereof.

Henry K. Jones,
Notary Public of New Haven,
State of Connecticut.

8. (*a*) By whom are subpoenas issued from a District Court, and where may they be served? (*b*) What is the usual number of jurors in any case where a jury is impanelled and how is this number changed?

9. John Phillips is the landlord of the premises No. 1 Broadway. Arthur Cole is a tenant from month to month of a suite of offices in the building, and makes default in payment of rent. State briefly the steps which Mr. Phillips will have to adopt to dispossess Mr. Cole, assuming that the Defendant does or does not appear and defend, as you prefer. Describe each step from the inception of the proceedings to their final conclusion by the eviction of Mr. Cole. It is not required that you should draft any of the papers.

10. Give the substance of an execution issued out of the District Court in a case where the Defendant cannot be arrested.

11. What is a transcript of a judgment? How is it obtained? Where is it filed? What are the legal consequences of its filing?

12. Make the proper docket entries for the following case: William F. Doe sues Mary K. Kyle on an unpaid cheque for $50, serving a verified complaint. The defense is lack of consideration. Several adjournments are had, a commission is issued to Burlington, Vermont, and a jury trial is had. Assume such names, dates, and other facts as you please.

13. Who receives the fees in a District Court? To whom and how are they paid over?

14. Frederick Henry recovers a judgment against Charles Thomas for $175. Thomas wishes to appeal and stay execution. (*a*) What steps must Thomas take? (*b*) Before what body will the appeal be heard, and how is it constituted? (*c*) What part does the justice of the District Court play in the perfection of the appeal?

You may assume any proceedings on the part of either party which will be appropriate.

## ARITHMETIC.

1. Add 1760501; 6410324; 6486262; 5949582; 6270086; 5591014; 5543110; 4794755; 5135679; 5116861; 5330775; 5973790; 5749306; 6320194; 7102180; 7609242; 8705835.

2. Will $3,336 yield a larger income if invested in an 8% stock at 139, or if loaned at 6% simple interest, and what is the difference of income in the two cases?

3. Simplify $\frac{0.203 \times 0.0004 \times 16}{0.008 \times 0.0029}$

4. In an examination the maximum mark for which was 100, A got 68 marks and B got 10½% more than A. What was B's mark, and what per cent. of B's marks were A's?

5. How many $100 bonds at 5% premium can be bought for $8,400?

6. What number contains 1832 as often as 6.9 contains 0.023?

7. A man owns 7-64 of a ship. If he sells 1-5 of his share, what fraction of the whole will he still have?

8. A tailor cuts 9 2-14 yards of cloth from a piece measuring 44 4-14 yards. How many vests, each requiring 1 1-7 yards can he make with the remainder?

9. Divide $4,832 among three persons in proportion to their ages, which are respectively 20 yrs., 24 yrs., 26 yrs.

## LETTER-WRITING.

Write a letter of 250 words or more to some fictitious friend, giving your opinion on the following question: *Should the District* Judges and the City Magistrates alike

be elected by the people, or should they alike be appointed by the Mayor?

### Spelling.

Procedure, summary, supplementary, assignment, characteristic, codify, appreciate, indictment, subpœna, marshal, principal, relieve, judicial, interpleader, cumulative, pursuant, colonel, blackguard, receiver, proceeding.

### Dictation.

The subjects of every State ought to contribute towards the support of the government, as nearly as possible in proportion to their respective abilities; that is, in proportion to the revenue which they respectively enjoy under the protection of the State. The expense of government to the individuals of a great nation, is like the expense of management to the joint tenants of a great estate, who are all obliged to contribute in proportion to their respective interests in the estate. In the observation or neglect of this maxim consists the equality or inequality of taxation.

## Stenographer and Typewriter—Women.

DICTATION.

Date: April 25, 1901.

Municipal Civil Service Commission,
346 Broadway, New York, (Date).

Mr. Joseph P. Harrison,
Springfield, Mass.

Dear Sir: I beg to acknowledge the receipt of your favor of the 17th inst., in which you ask me whether the Municipal Civil Service Commission of this city has ever considered the propriety of taking any steps to avoid unnecessary examinations, and also to check the prevalent practice of certain persons applying for all sorts of positions for which they are poorly qualified, or not qualified at all.

To the first part of your question I may say that our main resource is found in the rule authorizing certification from the "most appropriate" list, in case there is no list exactly corresponding to the requisition. Another step in the same direction, and a very important one, is the new rule authorizing the Commission, in its discretion, to extend the life of an eligible list to a period not exceeding four years.

To the second part of your question I regret that I am unable to give any satisfactory answer. Our examination rooms are encumbered by scores of candidates who have no business there. One instance has recently been brought to our attention of a man who has filed over one hundred applications in three years. This person, who, to all appearances is ill-fitted for any position, apparently goes on the theory that if he exposes himself with sufficient frequency, the lightning must surely strike him at last.

In England this bad practice is checked by exacting a fee *from every* candidate for examination. It does not seem,

however, at all probable that we shall ever adopt this custom, and I can think of no other method which would be so effective.

You further ask for the subjects and weights in our examination for stenographer and typewriter. These are shown in the following table:

| | |
|---|---|
| 1. Accuracy | 5 |
| 2. Speed | 2 |
| 3. Spelling | 1 |
| 4. Handwriting | 1 |
| 5. Arithmetic | 1 |
| Total | 10 |

You may be interested in seeing how the United States Commission arranges its examination for stenographer:

| | |
|---|---|
| 1. Arithmetic | 5 |
| 2. Penmanship | 5 |
| 3. Letter-writing | 5 |
| 4. Copying from rough draft | 10 |
| 5. Stenography | 75 |
| Total | 100 |

I shall be glad to hear from you if you have any ideas on the matters spoken of above.

Believe me, with best wishes,

Yours, very respectfully,

## ARITHMETIC.

1. Add 298376520; 199877255; 270930460; 917856287; 264698889; 287658849; 178987655; 226548379; 273895764; *587786349.*

2. *Divide 14.425176772* by the product of 478.9 and 49.87.

3. Find the time on which the interest on $270 will be $87 at 7%.

4. Simplify $\frac{16\ 2/3 \times 4 \times 8\ 1/2}{8\ 1/3 \times 32 \times 34}$

5. Find the total annual cost of a house, of which the rent is $864, the gas rate is 1/54 of the rent, the water-rate is $\frac{2}{3}$ of the gas rate, and the expense of cleaning the sidewalk is $\frac{3}{8}$ of the water-rate.

LETTER.

Write a letter of not less than 250 words, properly dated, addressed and signed, to some friend, in answer to an inquiry as to how to go to work to secure a position as typewriter in a city department office.

N. B.—This letter is a test of grammar, composition, etc.

---

## Typewriting Copyist.

INDIVIDUAL DICTATION.

Municipal Civil Service Commission,
346 Broadway.
New York, 11 June, 1902.

Mr. Henry L. Morris,
Buffalo.

Dear Sir: In reply to your favor of the 8th instant, I desire to state that the cabinet which we ordered of you, and which arrived the day after your letter, is satisfactory in nearly every respect.

In the points mentioned below, however, it does not suit us, and it does not appear to be quite in accordance with the specifications and contracts.

*1st. The rollers* are very stiff and the cabinet is difficult *to open and shut.* Probably this defect could be remedied

by one of your workmen, but we do not know how to go about it and do not care to make experiments.

2d. The key seems to us to be of too common a pattern and too easily duplicated. It is of the utmost importance that no one, except those authorized, should have access to the papers to be kept in the cabinet. We would request you, therefore, to change the lock and put in one with which we could feel a greater degree of security.

Trusting that I am not asking too much, I remain

Yours respectfully,

Chairman.

## ARITHMETIC.

1. Add 17689547831; 27384958473; 27384928767; 68954789876; 27384958762; 26789346788; 96857463277; 19876543234; 32425262728; 27893467892; 26789346782; 21314151617; 26789342673; 26734567265.

2. Multiply 98.7064 by 690.5.

3. Find the interest of $897.05 for 4 years 2 months and 12 days at 5%.

4. Convert $\frac{11}{125}$ to a decimal fraction.

5. Convert .000125 to a common fraction.

6. Divide $5\frac{1}{2}$ by $3\frac{3}{8}$.

## LETTER.

Write a letter of not less than 250 words, properly dated, addressed and signed, to some friend, who asks your advice about taking up typewriting as a career.

N. B.—This letter is a test of grammar, composition, etc.

Copying from rough draft.

Make a fair copy - typewritten -
of the following:

Rule 33

When the services to be rendered by an appointee are for a temporary period not to exceed three months the appointing officer may appoint from the eligible list in accordance with the second paragraph of Regulation 27 any convicted person willing to accept such temporary appointment shall not deprive the appointee of his right to future certification for permanent appointment nor shall said appointee be entitled to promotion reinstatement or transfer Successive temporary appointments shall be made to the same position nor shall more than one extra clerks are required for temporary employment clerks may be employed without examination during the specified periods respectively

until the need of such service is supplied by appointees

(at the discretion of appointing officer)

employment and a sufficient number of candidates on the eligible list after due certification will not accept such temporary

to the privileges conferred by the provisions of the rules relating

## Bookkeeper.

### Arithmetic.

| 1. Add | 2. Add |
|---|---|
| 189685746352678934 | 273849278 |
| 233455677899234567 | 210003427 |
| 263748592789937889 | 278932678 |
| 243647586928374665 | 968574635 |
| 243546578992773879 | 267348277 |
| 179615948235426997 | 796857463 |
| 654333552300654270 | 187965789 |
| 283948278547732656 | 176895478 |
| 189078546789253928 | 278934876 |
| 657843989796572332 | 769584326 |
| 263748592876543245 | 273849572 |
| 243546576824678659 | 866755833 |
| 987654329876543298 | 213141516 |
| 867564532425672843 | 263784927 |
| 256789367823567234 | 263748592 |
| 243547589267832566 | 189685743 |
| 243255327899765486 | 543289346 |
| 159413894132553378 | 189765443 |
| 298543678654787579 | 273849287 |
| 758463298654321811 | 998877665 |

3. Find the cash balance, Sept. 30, 1886, on the fo account, including interest at 6%:

Dr. Wm. Callen, in % current with H. A. Rice.

| 1886. | | | | 1886. | | | |
|---|---|---|---|---|---|---|---|
| Feb. 5 | To Mdse. 30 da. | $284 | 00 | Apr. 30 | By Cash | $ | |
| Mar. 7 | " " " " | 370 | 00 | May 18 | " " | | |
| Apr. 12 | " " " " | 590 | 00 | Aug. 28 | " " | | |
| *May 24* | " *Cash* | 840 | 00 | Sept. 15 | " " | | |

4. On Jan. 12, 1884, J. Fagan & Son sold Ferguson Bros. & Co. a bill of merchandise amounting to $1825, on 3 months' credit; and on Feb. 11, 1884, J. Fagan & Son borrowed from Ferguson Bros. & Co. $2500. What should be the date of an interest-bearing note to be given to J. Fagan & Son in settlement of the balance due Ferguson Bros. & Co.?

5. A ship is insured for enough more than its value to include the cost of insurance at 1¼%, and $6 for the policy and survey. If the value of the ship is $51350, what should be the sum insured?

6. Harvey and Roberts engage in business Jan. 1, 1885, Harvey investing $5000, and Roberts $8000. On May 1, Harvey invested $2000 additional; and on June 1, Roberts withdrew $1000. On Aug. 1, they took in Williams as a third partner, who invested $7000. On Jan. 1, 1886, their net gain was $5000. What was the share of each partner?

## Special Paper.

1. A starts in business with $1500 in bank, goods which cost $8000, and furniture and fixtures which cost $1250. He owes $2000 on open account for goods and $3000 borrowed money for which he has given his notes. Journalize and post these items.

2. Show how you would close merchandise account at the end of the year after stock-taking.

3. When do you credit bills payable account?

4. What does a debit balance in profit and loss account indicate?

5. Mention a ledger account in which all the entries are usually debit. How do you close such an account?

6. John Smith gives Thomas Brown a quarter interest in his business for $20,000 cash. Show exactly how the transaction would appear on the ledger.

7. How would you transfer on your books $5000 from contingent account to salaries account?

8. If in drawing off a trial balance you found the totals differed by nine cents or some multiple of that amount, what would you infer caused the error?

9. How do you determine from a balance-sheet the net profits?

LETTER.

Write a letter of not less than 300 words, properly dated, addressed, and signed, to some friend, on the recent disaster in Martinique.

**romotion to Librarian—N. Y. Public Library—Public School Reading-rooms.**

1. In establishing a free circulating library of about one ousand volumes in a part of the city inhabited chiefly by reigners, would you advise that all of the books be in the nglish language? If not, what percentage should be in reign languages? Give the reasons for your answer.
2. What proportion of such a library as is referred to in estion No. 1 would you recommend to be devoted to prose? ion? to history? travel and biography? to popular science?
3. Name the ten reference books which you consider most ential to a library.
4. Give the title of six books you would suggest to each the following persons asking your advice as to their read-: (*a*) a schoolboy of fourteen; (*b*) a shopgirl of twenty; a mechanic of thirty; (*d*) a tradesman of forty-five.
5. What steps would you take to prevent books being torn otherwise defaced?
6. Would you advocate allowing users of the library to e out more than one book at a time? If so, what, if any, trictions would you place upon their choice? Give the sons for your answer.
7. What course would you pursue to induce the residents a tenement-house neighborhood to use a newly estab-ed free circulating library?
8. Which qualifications do you consider most desirable in erson appointed to take charge of such a library as is re-red to in question No. 7: (*a*) those derived from educa-n; (*b*) those acquired by previous library experience; (*c*) or h natural attributes as tact, sympathy, patience, etc.? plain fully the reasons for your preference.
9. *How many years* were you at school or college, and *t, in general,* was the character of your studies? De-

scribe fully your occupation (with dates) since completing your education.

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**Promotion to Librarian in Charge—Branch Library—Brooklyn.**

1. If, in establishing a new branch library, $10,000 were appropriated for the purchase of books, how much of this would you use for (*a*) fiction, including juveniles; (*b*) other distinctly popular books, and (*c*) such reference works as encyclopædias? Would you expend any of this for books in foreign languages, and if so, how much?

2. What are the principal objections to large libraries (e. g., the Library of Congress or the Boston Public Library) printing dictionary catalogues?

3. Describe the printed class-list, showing by samples the different kinds of entries said list, if full, should contain.

4. To how great an extent should a free lending library duplicate current popular novels?

5. What three qualifications are most desirable for a librarian (*a*) exclusive of those acquired by education; (*b*) acquired by education?

6. Is it within the province of a free library to contain directories? Give the reasons for your answer.

7. If an author chose to publish all of his writings under a pseudonym (the same in all instances), would you catalogue them under that pseudonym or under his real name, if known to you? Give the reasons for your answer.

8. If in charge of a local library, what means would you take to collect data relating to the history of that locality?

9. Without regard to the method pursued at the Brooklyn Public Library, how would you catalogue a book entitled: *The Life and Times* of the First Duke of Marlborough, by *a loyal follower of King* James III?

10. Write a letter of more than a page, expressing your views on the proposition to consolidate all the free libraries of the City of New York under one directory.

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**Promotion to Library Attendant—N. Y. Pub. Library—Public School Reading-room.**

1. In your opinion is it desirable to make and enforce any rules regarding the personal cleanliness of users of a free circulating library? Give the reasons for your answer.

2. If the users of a free circulating library are to have access to the shelves, how would you prevent theft of books?

3. Suggest a simple plan for numbering the books in a circulating library of about one thousand volumes.

4. What steps would you take to prevent books being torn or otherwise defaced?

5. If at the hour of closing, say 10 P. M., there were a dozen people waiting for books, would you wait upon them before leaving, or tell them to come again the next evening? Give the reasons for your answer.

6. What books would you suggest to people who wished to read something about (*a*) The War of the Roses; (*b*) The Holy Grail; (*c*) The Know-nothing Party; (*d*) The Peninsula Campaign; (*e*) The Feudal System.

7. Give the three qualifications (natural or acquired) you consider most desirable in a librarian or library attendant.

8. How many years were you at school or college, and what, in general, was the character of your studies? Describe fully your occupation (with dates) since completing your education.

9. Write a letter, properly dated, addressed and signed, to Mr. Billings, giving your reasons for applying for this position *and your qualifications* for filling it.

## Nurse.

### Duties.

1. Describe how you would make a hospital bed.

2. (*a*) In what ways may body temperatures be taken? (*b*) Which gives most accurate results? (*c*) What is the range of temperature in disease? State some causes of low and of high temperature. (*d*) How may records of a patient's temperature be kept? (*e*) How do you care for the thermometer to insure cleanliness?

3. What is the dose for an adult of (1) Laudanum; (2) Sal Rochelle; (3) Tincture of Aconite; (4) Chloral Hydrate; (5) Pulv. Glyc. Comp.?

4. What are important points to be observed in catheterizing? (Give reasons for these precautions.)

5. What are precautions to be taken in giving a hypodermic injection? (Again give reasons.)

6. What should be done in a tuberculosis ward to prevent the spread of the disease?

7. Mention diseases in which bed-sores are apt to develope and discuss how they may be prevented.

8. How would you give a "tub bath" for reducing temperature?

9. Mention other ways in which cold water may be used for reducing temperature, and give a brief description of each.

### Arithmetic.

1. Add 789653; 973876; 847968; 983479; 432848.

2. Subtract 140989 from 320478.

3. Multiply 47098 by 6097.

4. *Divide 3980823* by 4389.

## Head Nurse.

### Duties.

1. (*a*) State briefly your understanding of the duties of a Head Nurse. (*b*) Mention some common faults of nurses and orderlies.

2. (*a*) How would you make a pint of a half-saturated solution of boracic acid? (*b*) How a gallon of 5% solution of carbolic acid? (*c*) Mention antidotes for carbolic acid (internally), and for carbolic acid burns.

3. How would you arrange bottles in a drug-room in order to lessen liability to mistakes in dispensing same?

4. What are the ordinary medicinal doses for an adult of: (1) Tincture of Aconite; (2) Nitroglycerin; (3) Morphine Sulphate; (4) Codeine; (5) Deodorized tincture of opium; (6) Strychnine sulphate; (7) Potassium Iodide; (8) Sodium Salicylate; (9) Tincture of Belladonna; (10) Potassium Acetate?

5. How would you prepare a patient for an operation on the skull?

6. (*a*) Mention inflammable substances and remedial measures in common use in ward and about patients. (*b*) What would you do if patient's clothing took fire? (*c*) What parts would you particularly protect, and why?

7. Discuss various methods of mechanical restraint for a violent patient, how applied, etc., and state your preference.

8. (*a*) What is approximately the appropriate temperature for an infant's bath? (*b*) What for a sponge bath for reduction of temperature? (*c*) Discuss, in detail, how you would give a "tub bath" for reducing fever.

9. What system would you suggest to prevent loss of stock from linen-supply of ward?

10. (*a*) What is the object of adding an alkali or carbonated water to milk? (*b*) How would you direct nurse to

peptonize milk? (*c*) How would you direct nurse to prepare junket?

11. Discuss care of mouth and tongue in febrile condition. Why is it necessary?

ARITHMETIC.

1. Add 768946; 499765; 876978; 927346; 789646.
2. Subtract 390984 from 420071.
3. Multiply 40987 by 6089.
4. Divide 3144805 by 7689.

EXPERIENCE.

Applicant is asked to give details of education, and experience and knowledge of foreign languages.

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## Matron.

DUTIES.

1. Draw up a set of rules for your own conduct with reference to your dealing with your subordinates.
2. What system of records or accounts would you keep of the linen placed in your care?
3. What would you do if you should detect the smell of smoke, without being able to discover its source?
4. If you should receive an anonymous communication on any subject connected with your institution, would you pay any attention to it? Give fully your reasons for your answer.
5. State fully how you would keep the closets and sinks clean.

ARITHMETIC.

1. Add 47868; 69278; 37647; 84695; 76985.
2. Subtract 48968 from 72035.
3. *Multiply 76089* by 4096.
4. *Divide 2653804* by 4372.

## Apothecary.

### TECHNICAL.

1. Give official names for: Sugar of Lead; Monsel's Solu-ɔn; Lugol's Solution; Donovan's Solution; Hives Syrup; eam of Tartar; Vienna Paste; Friars' Balsam; Huxham's ncture; Bleaching Powder.

2. (*a*) State medicinal dose for adult of each of the fol-wing:

(*b*) Give synonyms for each: Oleum Tiglii; Oleum nygdalæ Amaræ; Hydrarg. cum Creta; Liquor Ferri et nmonii Acetatis; Resina Podophylli; Ammonii Chloridum; po; Pulv. Morphinæ Comp.; Sodii et Potassii Tartras; ydrargyri Subsulphas Flavus.

3. What is the composition of: (1) Comp. Syrup of Squill; ) Comp. Liquorice Powder; (3) Comp. Jalap Powder; (4) mp. Vegetable Cathartic Pill; (5) Pilulæ Ferri Carbonatis.

4. What can you say of Formalin, its composition, manu-ɔture, and its uses?

5. (*a*) How is Sulphuric Ether formed? (*b*) How is roxide of Hydrogen formed?

6. What is the solubility in water of: (1) Carbolic Acid; Resorcin; (3) Boric Acid; (4) Benzoic Acid; (5) Salicylic id; (6) Ammonium Benzoate; (7) Iodide of Potash; (8) troglycerin.

7. Write chemical formula for: (1) Sulphate of Magnesia; Calomel; (3) Red Iodide of Mercury; (4) Tartar Emetic; Zinc Chloride.

8. (1) How would you test for the presence of soluble orides?

(2) Ditto soluble sulphates?

(3) Give tests for starch.

(4) State *two* tests each for the presence of silver and *l salts in solution.*

9. (*a*) How is the antidote of arsenical poisoning pr pared?

(*b*) What are antidotes for carbolic acid poisoning?

(*c*) What will most quickly relieve carbolic acid burn (externally)?

(*d*) What is the most available antidote for oxalic ac poisoning?

(*e*) State antidote for phosphorus.

10. Write the following prescriptions in the way commo to the profession, and criticise each, especially as regard dosage and compatibility of drugs:

(*a*) Tincture of nux vomica 3 drachms; Fowler's Solu tion 2½ drachms; syrup of orange 1 oz. Dilute muriatic aci 2 drachms; water to 4 oz. Dose a teaspoonful three times day.

(*b*) Tinc. of chloride of iron ½ oz.; glycerine 6 drachms tannic acid ½ drachm; saturated solution of chlorate o potash to 4 oz. To be used as gargle.

(*c*) Codeine 5 grains; ammonium chlodire 1½ drachms; dilute prussic acid 1 drachm. Syrup of Tolu to 4 oz. To be given, a teacupful every three hours.

## ARITHMETIC.

1. Multiply 7 lbs., 6 ounces, 1 drachm, 2 scruples by 16.

2. In 8 lbs. avoirdupois how many drachms apothecaries' weight?

3. A man had a barrel of cider containing 42 gals. He sold 6 gals. to one neighbor, 6 qts. to another, and 6 pts. to a third. What is the remainder worth, at 5c. per qt.?

4. Change 15 degrees Fahrenheit to Centigrade, and 15 degrees Centigrade to Fahrenheit.

## Laboratory Attendant and Laboratory Assistant.

### DUTIES.

(To be answered by all candidates.)

1. What are the duties of a Laboratory Attendant?
2. How would you clean glass laboratory utensils?
3. Name two disinfectants used in solution, and state per cent. strength of each usually employed.
4. How would you sterilize (*a*) glass articles? (*b*) rubber articles? (*c*) cotton? (*d*) steel instruments?

(For candidates for Bacteriological Laboratory.)

5. What should be done with cultures from diphtheria patients and with tuberculous sputum after examination?

(For Vaccine Laboratory.)

5. (*a*) How is a calf vaccinated? (*b*) How should the hands be prepared before handling vaccine virus? (*c*) How is vaccine virus preserved after it is made up? (*d*) Describe a vaccine outfit.

(For Antitoxin Laboratory.)

5. (*a*) Describe in detail how diphtheria antitoxin is sealed and labelled for distribution. (*b*) What is the chief thing to avoid in this process?

(For Chemical Laboratory.)

5. How may water be boiled in a glass flask without danger of breaking same?

### ARITHMETIC.

1. Add 768946; 848963; 567485; 789648; 439677.
2. What will be the cost of a mixture of 3 gal. of spirit at $2.80 per gal., and 5 gal. at $3.50 per gal.?
3. Convert 68 degrees Fahrenheit to degrees Centigrade, and 17 *degrees Centigrade* to degrees Fahrenheit.
4. *Multiply 40.718* by 60.08.

## Laboratory Assistant—Special.

1. What is a laboratory? State briefly your understa ing of the duties of a laboratory assistant.

2. What do you understand by the terms Pipette; Gra ate; Capillary tube; Vacuum; Test tube; Sand-bath; Spati

3. What is a Bunsen burner, and what its uses and vantages over other flame? What is a saturated soluti What a dilute solution? What a re-agent?

4. (*a*) What do you understand by the terms distillat distillate, and residue? (*b*) How would you evaporat solution to dryness, in order to get its solid constituents such constituents were liable to be destroyed by heat?

5. What is meant by the term sterilization, and in w various ways may it be accomplished? Apply same to st lization of hands, instruments, culture media. etc., etc.

6. (*a*) What is the unit of quantity (measure or volu called in the metric system? of distance? of weight? What is the approximate equivalent in the English syst of a kilogram, litre, and centimetre, respectively.

7. (*a*) State how you would prepare one gallon of 1-2000 solution of bichloride of mercury. For what p poses may such a solution be used? (*b*) How many gra of nitrate of silver are necessary to make 128 c.c. of a solution of this in water?

8. (*a*) What products are made in the city laborator (*b*) What is the ultimate distribution of these products.

9. How would you thoroughly clean and dry a glass fl with a long and narrow neck?

10. What is vaccine? What is its source? How is it up for the market by the Department of Health?

11. What are bacteria? Why should vaccine, etc., be free as possible from any bacterial contamination?

12. *What is diph*theria antitoxin, its source, uses, a *how is its strength* standardized?

## Orderly.

### Duties.

1. What are the duties of hospital orderlies?

2. State what you understand by the following terms: Septic, antiseptic, suppository, lavatory, sterilizer, ventilation, camisole, catheter.

3. If ordered to give a high enema, how would you go about it?

4. (*a*) Name three or more substances in ordinary use for the destruction of vermin on patients, and tell how they are employed, strengths, etc., etc. (*b*) What is the best way to rid clothing of such vermin?

5. (*a*) What bad results follow neglect in caring for a patient with incontinence of urine? (*b*) Such a patient is put under your care; state, in detail, what you would do to prevent such bad results.

6. (*a*) How may the stools of typhoid patients be disinfected? (*b*) Why is such a step necessary?

7. Discuss the care of a patient, his clothing, and other effects, from his admission to the hospital to the time he is put in bed.

8. Name three substances of use in deodorizing and disinflecting urinals, etc., and stage strength of solution of each requisite.

9. How is a patient prepared for the supra-pubic operation for stone in the bladder? (All details to be given.)

10. (*a*) What is a clinical thermometer? (*b*) What is the normal temperature of the human body? (*c*) What is the normal pulse rate and rate of respiration?

## Medical Inspector.

1. Discuss the clinical history and differential diagn of typhus fever.

2. Give the differential diagnosis of measles from all c ditions which may resemble it.

3. Discuss the etiology, clinical history and differen diagnosis of epidemic cerebro-spinal meningitis.

4. (*a*) What ordinary infectious diseases of children apt to be followed by tuberculosis? (*b*) What are the ph cal signs of incipient tuberculosis (pulmonary)? (*c*) W are the physical signs of chronic phthisis?

5. Mention drugs which may cause skin eruptions, state diseases which each may simulate.

6. (*a*) Discuss the differential diagnosis of yellow fe (*b*) What are the recent ideas as to its causation?

7. State, in each of the following diseases, the areas the body where rash is apt to appear first, the day on wh it appears, and the characteristic points about its ea eruption: (*a*) Rotheln; (*b*) varicella; (*c*) small-pox; (*d*) typh fever; (*e*) scarlatina.

8. (*a*) Discuss etiology and treatment of trachoma. What infectious diseases are likely to lead to otitis medi

9. Describe the essential features of an efficient system sanitary plumbing for a dwelling.

10. Classify the summer diarrhœas of children, and g symptoms and treatment of the most common variety.

## Deputy Superintendent of Hospitals and Asylums.

### Duties.

1. (*a*) State, briefly, the duties usually performed by the deputy superintendent of such institution. (*b*) State, specifically, his duties in the absence of the superintendent.

2. (*a*) If placed as deputy superintendent in an institution new to you, what would be your first procedure in your official capacity? (*b*) How would you later keep yourself informed as to affairs in the hospital?

3. What are the official relations between the deputy superintendent on one hand and (*a*) the steward; (*b*) the engineer; and (*c*) supervising nurse on the other?

4. (*a*) What final disposition may be made of the bodies of the unknown dead? (*b*) What precautions would you take to prevent error in such cases? (*c*) What is to be done with the effects of people dying in the institution, either known or unknown? (*d*) What rules would you suggest regulating autopsies upon bodies of patients dying in the hospital?

5. (*a*) What records should be kept of patients in such institutions? (*b*) State all the objects intended to be gained by such records.

6. Under what circumstances is the death of a patient not to be reported in the usual way to the Department of Health? State what is to be done in such cases.

7. Bruises or discolorations are reported on an idiotic or feeble-minded child; such injuries might have been accidental, self-inflicted, or inflicted by another inmate, or by an attendant. You are delegated to investigate same and report to the superintendent. State exactly how you would proceed.

8. A *regular* fire-drill is obviously necessary in such institutions, but none exists in that to which you have been as-

signed. State how you would organize and conduct same, how frequently, and with what precaution you would have drill.

9. (*a*) Discuss ventilation, the methods by which natural forces may be made available, various methods of artificial ventilation, etc. (*b*) How much air space should be allowed in a ward for an adult, and for a child?

10. What are the fundamental principles of a good system of sanitary plumbing?

## ARITHMETIC.

1. Divide 3.01460832 by 437.28.

2. Sold goods at 25, 16, and 5% off, and the discounts amounted to $722.70. Find the cost.

3. A foundry was sold at auction for $3960 which was 11/16 of its cost. What was the loss per cent.?

4. A floor is 28 ft. long, and its two ends are 19 feet and 16 feet wide. What is its area?

5. A man owning a lot 81 rods long by 48 rods wide, exchanged it for another lot of equal area, whose length was three times its width. How much more fence did the latter require?

## Examiner of Charitable Institutions.

GENERAL PAPER.

1. What do you understand to be the existing conditions which make it desirable to appoint examiners of charitable institutions?

2. By what principle should the city be guided in expending money for charitable purposes, and within what general limits should such expenditure be confined? Give full reasons for your answers.

3. What evils are likely to arise from a lax system in these matters on the part of the city?

4. You are detailed as examiner to investigate the accommodations for maternity cases in the public hospitals and those in private hospitals subsidized by the city, and also the number of cases treated in both classes. State fully how you would go to work.

5. In investigating an application for admission into a city maternity hospital, should the examiner take into consideration the question of morality? Give reasons for your answer.

6. Assuming such facts as you please, write a report to the proper authority of an investigation made under question 4. Sign this report with your examination *number* and not your name.

7. Discuss the following quotation from a recent report of the Comptroller:

"It would seem as though the city should not deal with private hospitals except as subsidiary aids or adjuncts to the public institutions."

8. What points would you take into consideration in determining whether a patient received in a hospital was to be *accounted* a proper city charge?

9. *The* Department of Finance desires that private hos

pitals receiving city moneys for the care of patients should, if possible, deposit such moneys in a bank in which other moneys of such institution are *not* kept. What, in your opinion, is the ground for this request?

10. Without reference to the actual requirements of the Department of Finance, state what, in your opinion, should be the kind of accounts kept by charitable institutions receiving public moneys as to such moneys, and the form of records as to the beneficiaries of such public moneys.

## Arithmetic.

1. Multiply 43,097 by 8,509.

2. One hospital can accommodate 144 patients, a second 216, and a third 360. Distribute 440 patients among them in proportion to their relative capacities.

3. Find the total product of each principal crop produced in Massachusetts in 1800 from the following data:

| | No. of Acres. | Average yield per Acre. |
|---|---|---|
| Indian Corn | 55,980 | 33.5 Bushels |
| Buckwheat | 5,212 | 20 " |
| Rye | 24,600 | 17.5 " |
| Oats | 23,139 | 31 " |
| Potatoes | 41,620 | 126 " |
| Hay | 799,714 | 1.08 Tons |

4. Make out the following bill:

Nov. 3d, Mrs. J. H. Dole bought of Smith & Felton, New York, 5 yards of velvet at $3.50, 8 yards of cashmere at 87c., 4 yards of silesia at 25c. Nov. 8th, she bought 7 yards of flannel, at 42c., 43 yards of sheeting at 28c., and 4 yards of cambric at 37c. Date the bill ahead, January 1st.

5. The pupils in a certain school are divided into eight grades. In the first grade there are 123 pupils; in the second, 111; in the third, 97; in the fourth, 88; in the fifth, 86; in the sixth, 83; in the seventh, 66; in the eighth, 48. What *per cent. of the pupils* are in each grade? How near to 100 *per cent. does the sum* of your results come?

## Inspector of Tenements.

SPECIAL PAPER.

1. Enumerate the evils which are likely to arise from overcrowding in tenement-houses.

2. Suppose a fashionable apartment-house, five stories high, with two apartments on each floor. There are no kitchens in any apartment, but the occupants take their meals in a restaurant on the ground floor. In the summer the restaurant is closed for several months for repairs. Some of the tenants then prepare their own breakfasts in their apartments. Does this action make a tenement-house of the place or not? Give reasons with your answer.

3. Explain the meaning of the following terms: "Goose-neck ladder," "winder," "string" in stairways, "louvre."

4. State the principal changes made in the Tenement-house Law by the amending act of 1902.

5. Under what conditions may a cellar be occupied for living purposes?

6. What is the provision of the law as to stairways on non-fireproof tenements to be hereafter erected?

7. If in making an inspection you should find tenants beating a carpet on a roof or hanging it out of windows, what would you do?

8. What are the requirements as to lighting public halls in tenements? (This question refers both to windows and artificial lighting.)

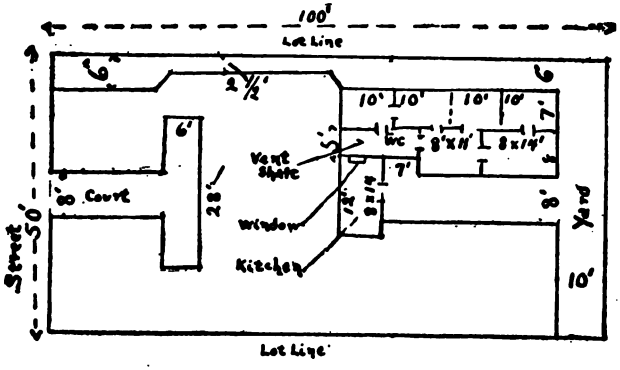
9. In what way is the height of a tenement-house determined by the width of the street on which it is built?

10. What restrictions are there as to building rear tenements?

11. *Why is it* forbidden to connect the waste-pipe from a *bath-tub with* a water-closet trap?

12. Why is it required that plumbing work under water-closets should be uncovered?

13. You are sent to inspect three tenement-houses of different character. In some instances you find violations of the law as to construction, and in some violations of the sanitary code. Assuming such facts as you please, write a report, addressed to the Commissioner.




14 & 15. The above is an imaginary sketch of a floor in a tenement-house. The house is 57 feet high. State, clearly, any and every way in which it conflicts with the law.

ARITHMETIC.

1. A corner lot extends 92 feet on one street and 45 feet on the other. The streets are at right angles to each other, and the side parallel to the 92 feet side measures 84 feet. How many square feet are there in the ground floor of a block which covers 87 per cent. of the above lot?

2. Multiply 300.75 by 9.2046.

3. Divide 12.835865 by 629.5.

4. A lot whose front is 240 feet and whose depth is 100 feet is bought by A, B, and C, who pay, respectively $3000, $4000, and $5000. To how many feet front is each entitled if it be divided in proportion to their investments?

EXPERIENCE.

Applicant is asked particulars as to education and employment. Also what attention he has given to questions of sociology, what opportunities he has had of observing conditions of tenement-house living, and what knowledge he has of other languages than English.

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## Sanitary Inspector, and Inspector of Light and Ventilation—Tenement-house Department.

TECHNICAL.

1. What evils, sanitary or moral, have existed in the past, not reached by previous city departments, which the Department of Tenement-houses is expected to correct? Answer this question completely, but concisely.

2. Give your opinion as to what makes the difference (*a*) in general language, (*b*) in legal terms, between an apartment-house and a tenement-house.

3. Explain, so that an ordinary person can understand, the meaning of the following requirements of the Tenement-house Law concerning fire-escapes: "The platforms or balconies shall be constructed and erected to safely sustain in all their parts a safe load at a ratio of four to one of not less than eighty pounds per square foot of surface."

4. What are the restrictions with reference to bakeries in tenement-houses? What do you understand to be the meaning of "fireproof materials" in connection with such restrictions? What are the "other dangerous businesses" as to which there are restrictions, and what is the meaning of the technical term used in the law with reference to them?

5. *State clearly* the difference between a court and a yard, *and also the* difference between a cellar and a basement.

6. The law provides that stairways on a fire-escape shall be placed "at an angle of not more than sixty degrees." From what line is this angle determined? Define the following words used in the same connection: "Goose-neck ladder," "battens," "clear headway," "tread," "string," "bracket."

7. Suppose an apartment with a kitchen sink, a water-closet and a wash basin. How many traps are necessary? State reasons for your answer. What, if any, differences in the plumbing arrangements would be necessary if the apartment were supplied with water from the street main or from a roof-tank?

8. State the rules or ordinances concerning the location and condition of fire-escapes. If fire-escapes are used as storage rooms, or as places for keeping flowers or the like, whose duty is it, apart from the Tenement-house Inspector's, to see that they are kept clear? If you saw such a case, what would you do?

9. What objection is there to enclosing plumbing fixtures with woodwork? In the city of Paris all gas-pipes must be exposed. Do you consider this a reasonable rule or not? Give reasons with your answer.

10. Taking the ordinary tenement-house, state what materials you consider best for the following named purposes: leaders, tubs, floors, partitions where there are windows and the windows themselves, drains, and give, in each case, your reasons.

11. State, clearly, the distinctions made in the application of the Tenement-house Law between houses already erected and those to be hereafter erected.

12. Draw up what you consider to be a proper blank form of report for a Tenement-house Inspector, and, assuming *three different buildings* and conditions, make out a full *report in each case.*

13. How often do you think an inspection should be made? Would the character of the tenants make any difference in this matter? Would the particular points to which your inspection was directed be determined in any way by consideration of nationality, length of residence, means of subsistence or similar considerations? If so, state clearly how and why.

TECHNICAL. (EXTRA PAPER.)

1. There are certain natural forces acting to produce ventilation in buildings, what are they? (NOTE: This does not refer to windows, ducts, courts, shafts, etc., which are only helps to ventilation.)

2. (*a*) Define what you mean by ventilation. (*b*) Can you have proper ventilation without light? (Give your reasons.)

3. (*a*) State what must be the cubical contents of an apartment for every person occupying the same. (*b*) What do you understand by an apartment? (*c*) State the minimum dimensions allowed for a bedroom in a tenement yet to be built. (*d*) State the same in an existing tenement.

4. State the difference between 7 square feet and 9 feet square, and show how you obtain it.

5. (*a*) Would the light radiating from a point be more intense or less intense as you move from it? (*b*) State the law governing the relative intensity of a light at two differing distances from the light.

6. (*a*) Is the purity of the air in a room dependent upon the size of the room or the amount of fresh air entering it? state which. (*b*) If the latter, about how much air should be supplied per minute for each individual occupying the room?

7. (*a*) State fully and clearly the arrangement and exact dimensions required of a window in an existing tenement. (*b*) State the law governing the size and arrangement, and

the minimum size allowed in tenements yet to be built. (*c*) State how windows must be measured. (*d*) State what the windows of every room in a new tenement must open upon. How does this differ from that for tenements now existing?

8. (*a*) Give an exact definition of the outer courts of a tenement and their sizes; (*b*) give an exact definition of the inner courts of a tenement and their sizes. (*c*) Why were the narrow courts previously in use not considered of sufficient size?

9. What provisions are made in the new law for the ventilation and cleanliness of shafts and courts? State fully.

10. A room is 13 ft. 10 in. long and 9 ft. 6 in. wide. It has one window 2 ft. 10 in. wide. How high must the window be to conform to the law for new tenements?

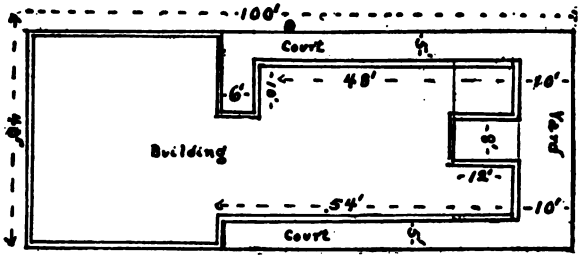
11. (*a*) A street is 70 feet wide. How high may a new tenement facing upon it be built? (*b*) State exactly how and where this height must be measured.

12. The law requires for every tenement on an interior lot, a certain amount of vacant space not built upon; is this space the same in area as a yard, or of what is it constituted?

13. (*a*) How many kinds of shafts are provided for in new tenements? (*b*) Which of these, if any, may be covered, and under what restrictions?

14. (*a*) What must be the minimum area and least dimension of a vent-shaft in a new tenement 48 feet high? (*b*) What must be the minimum size and area for a vent-shaft in an existing tenement, and under what conditions may this be reduced? (*c*) What rooms may have windows opening into vent-shafts?

PLAN.




It is proposed to build in accordance with plan above, a tenement-house 57 feet high. State whether it conforms with the law, and if not, give the points in which it is unlawful, and why.

ARITHMETIC.

1. There is a square lot of land 150 feet to the side. On the sides of the lot there is a house 28 feet deep in the form of a hollow square, leaving a square court in the centre. What percentage of the area of the lot is the area of the court?

2. Multiply 70.684 by 89.06.

3. Divide 28.7422542 by 472.89.

4. A is 45 years old. B is older than A by 12% of A's age. Find B's age, and express the difference of their ages as a percentage of B's age.

## Lay Sanitary Inspector.

### Technical.

1. What are the duties of a lay sanitary inspector?
2. How should the waste-pipe of a refrigerator or wa tank be connected?
3. What points would you observe when inspectin water-closet?
4. What defects would you look for when inspecting iron pipes in a building?
5. When may a cellar be used as a dwelling?
6. What does the Sanitary Code require in the cas privy vaults? Manure vaults?
7. How many cubic feet of air space must be allowe each person in a sleeping-room?
8. Define tenement-house.
9. Define lodging-house.
10. Define cellar.

### Arithmetic.

1. Add the decimals .25, .00375, .0125, and change sum to a common fraction.
2. Multiply 2 ft. 8 in. by 376.
3. In a hospital ward 30 ft. 6 in. long, 36 ft. wide, 18 ft. 9 in. high there are 27 patients. How many cubic of space are there for each patient?
4. A corner lot 65 ft. $\times$ 105 ft. has an apartment-h built upon it covering 87% of its surface. How many sq feet left unoccupied for yard and areas?

## Axeman.

### TECHNICAL.

1. Describe the shaping and driving of a stake so as to secure the best result as to solidity and accuracy of position.

2. What does a rodman have to do besides carry and drive stakes?

3. What conditions control the sizes and lengths of stakes?

4. How would stakes be set for a job of sewer work?

5. In doing street grading, where slopes have to be provided for, state the positions of all stakes that would be set at a cross-section in embankment, and also what marks would be placed on them.

6. (*a*) Describe fully the work of setting a centre stake on a transit line. (*b*) How are such stakes marked?

7. Describe the operation of cutting a good bench mark on the root of a tree.

8. In what other ways besides the use of stakes are stations marked on a line?

9. In doing leveling, where points have to be set on between stations what are such points called?

10. Describe the operation of setting reference stakes or otherwise referencing a point which may be lost unless so marked.

11. Describe the method you would pursue to cut straight on a line through brush.

12. (*a*) If called upon to set up a transit instrument, what two points are to be particularly attended to? (*b*) Would you screw the leveling screw very tight, or how?

13. *Write decimally* the following number: One million, *twenty-three thousand* and eighty and thirty thousandths.

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12. (*a*) If called upon to set up a transit instrument, what two points are to be particularly attended to? (*b*) Would you screw the leveling screw very tight, or how?

13. Write decimally the following numbers: One million, *twenty-three thousand* and eighty and thirty thousandths.

### Arithmetic.

1. Add 219 ft. 7 in., 847 ft. 9 in., 796 ft. 3 in., 654 ft. 11 in., 798 ft. 5 in.

2. Multiply 690,875 by 78,096.

3. Add 2/3, 5/8, 4/9, 11/16, 17/18.

4. If $9\frac{3}{8}$ yds. of cloth cost $\$26\frac{1}{4}$, how many yards could be bought for $\$24\frac{1}{2}$?

5. If $3\frac{3}{4}$ is $2\frac{1}{2}$ times a certain number, what is $3\frac{1}{3}$ times the same number?

6. Divide 322,622,362 by 78,746.

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## Promotion to Leveller.

1. (*a*) What is your age? (*b*) Have you had any technical education at an engineering school or elsewhere, and if so, what? (*c*) What practical experience have you had to fit you for the position of leveller? State this clearly, and give dates.

2. Describe carefully the adjustments of an engineer's level in their proper order.

3. (*a*) What would be the longest sight you would think it desirable to take in doing very careful work? (*b*) Give your reasons for so limiting the length.

4. (*a*) How far does the line sighted by a level depart from a true level at the end of the first mile; or, in other words, what is the amount of the earth's curvature for a mile? (*b*) Does curvature make a point sighted on appear too high or too low,—which?

5. (*a*) Describe what is meant by refraction. (*b*) Which of the two has the greater effect upon the correctness of levels, curvature or refraction?

6. *In practice how* are errors from curvature and refraction eliminated?

7. (*a*) What is parallax? (*b*) How may it cause errors in levelling?

8. (*a*) In levelling up or adjusting an instrument, how should all screws be left as to tightness? (*b*) What is the reason for this?

9. (*a*) What considerations govern the selection of a point at which to set up a level, in taking a line of levels? (*d*) Describe carefully the setting up in the best way.

10. What natural causes may affect the accuracy of levels, and must, therefore, be guarded against?

11. In taking a careful sight, state every precaution to be observed from beginning to end to insure accuracy.

12. What errors may be caused by carelessness or inexperience of a rodman?

13. If obliged to set your level on marshy or unstable ground, how can you get good results?

14. Divide 17.0965 by 209.07.

15. Obtain the square root of 46027.009.

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## Chainman and Rodman.

TECHNICAL.

1. State what points a rodman should keep a record of the reading on, and give a sample of such notes.

2. State all the difficulties a rodman has to contend against in trying to do good work in the city.

3. (*a*) In what way does the sun affect the work? (*b*) How does wind affect the work of levelling? (*c*) How may frost, ice, snow, etc., affect it?

4. Describe the characteristics of a thoroughly good turning point; also of a poor one.

5. *In what ways* are errors caused by a rodman being *careless or not* understanding his business fully?

6. Does it make any difference in the progress of work as to how the rodman locates turning points? and if so, state how.

7. Sketch a vernier on a rod and explain how it is that thousandths of a foot can be read by it.

8. What fraction of an inch is one-thousandth of a foot equal to?

9. Describe the sights used in running transit lines for back sighting to.

10. Name five things requiring close attention in making accurate measurements with tape or chain.

11. How does the heat of the sun affect a tape, and how is this compensated for in the use of an engineer's tape?

12. Describe clearly and fully the duties of a rear chainman in measuring up a hill.

13. How can the rear chainman hold the tape steady over a point?

14. (*a*) Describe the duties of a forward chainman; (*b*) How is the record of chain-lengths kept?

15. State all the difficulties that tend to introduce error in the work of chaining.

## MATHEMATICS.

1. Find the square of 20L 39/200. Find the square root of 3053.172 correct to four places of decimals.

2. A street a quarter of a mile long has on each side a sidewalk 7½ feet wide; what will it cost to pave this sidewalk (both sides) with stones each 2′ 9″ long by 1′ 8″ wide and costing 75c.?

3. Two vessels sail at the same time from the same place, one sailing due east and the other due north, at the rate of 6 miles and 8 miles an hour, respectively. How far apart will they be at the end of 12 hours?

4. A man paid $2262 for a field in the shape of a trape-

zoid. The parallel sides were 119 yards and 200 yards, respectively. The distance between them 110 yards. What did the land cost him by the acre?

5. How many square yards in a gravelled walk 6′ wide, running around a circular fish-pond whose diameter is 70 yards?

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## Transitman and Computer.

### Technical.

1. State the duties a transitman may be called upon to perform in the city of New York.

2. Describe a party organized for transit work and the duties of each person.

3. Where the best and most accurate work with a transit is required, describe every precaution requisite on the part of the transitman in adjusting, handling, protecting, and sighting his instrument. (See also next question.)

4. How are errors in reading the instrument and in graduation of the limb guarded against or minimized?

5. (*a*) What causes are there for error in long sights? (*b*) Can these be guarded against in any way, and if so, how?

6. Describe the operation of making an accurate survey of a city block, both exterior and interior, where every side is filled with buildings.

7. Give a sample of notes, as you would record them in your notebook, of a survey of a new street half a mile long, having several angles, and crossing other streets and a stream.

8. Describe the adjustment, for levelling purposes, of the long bubble which is attached to some transits.

9. Name all the other adjustments of a transit in the order *in which they should* be made.

*10. Suppose you* had to measure the distance between two

objects on the opposite side of a stream without crossing it. (*a*) Describe the instrumental work necessary. (*b*) Make a sketch and describe the method of making the computation of the distance.

11 and 12. A trapezoidal piece of ground has one end at right angles to the parallel sides. The sides measure respectively 110 ft. and 175 ft., and the inclined side has a length of 97 ft. Required first, to compute the perpendicular distance between the sides; and second, to cut off $\frac{1}{3}$ of the area from the widest portion by a line parallel to the sides, computing its perpendicular distance from the widest side. (Show all figures.)

13. What is the limit of error allowed in chaining in measurements on city streets?

14. How can you compute a very small angle without the use of tables, having given the distance run and the side opposite the angle required?

15. An area of ground is to be used as a borrow pit. It has been laid out by lines at right angles to each other at suitable distances and the cuts at each intersection determined. How would you determine the cubical contents?

## ARITHMETIC.

1. The inscribed circle in a regular octagon has a radius of 23 ft. What is the area of the figure?

2. Extract by logarithms the cube root of .0075218.

3. Multiply by logarithms $7.1263 \times 0.0439$.

4. The side of a right-angled triangle is 27 and the base is 13: (*a*) What is the natural sine of the angle opposite the base? (*b*) What is the natural tangent of the angle opposite the side? NOTE: Do this by arithmetic.

5. The radius of a circle is 50, what is the length of an arc of 28°? (*Do this* by arithmetic.)

## Supervising Engineer.

TECHNICAL.

1. Describe clearly what is known as metallic packing and its use.

2. Describe fully the work of turning and finishing a piston-rod in the best possible manner.

3. Describe the operation of setting the valves to a Corliss engine.

4. Knowing the size of a steam-boiler and pressure to be used, how would you determine the diameter of the safety-valve, the length of the lever, and the weight to be used on the lever.

5. Prepare a "card of instructions" for firemen such as you would adopt.

6. State how you would take up the lost motion due (*a*) to wear in crank-pin bearing; (*b*) to wear in wrist-pin bearing; (*c*) to wear in main bearings.

7. (*a*) Having a certain amount of power to transmit by belt from an engine to a line of shafting of the pulleys; state how you would compute the size belt required; (*b*) If one pulley is smaller than the other does it make any difference, and if so, what?

8. Make a sketch on a full sheet of paper of a battery of three boilers, showing all fittings and necessary connections; and also the pipings and connections to two engines for driving a large indirect heating plant.

9. Make, on a full sheet, a sketch of such a heating plant in two sections, for a large building, showing where the inlets and outlets should be placed in the rooms.

10. Describe every type of condenser in use, how it acts, and state clearly the advantages and disadvantages of each.

11. *Suppose you found a jet-condenser getting hot, what would you do?*

12. (*a*) Describe in a general way the apparatus in a steam-laundry; (*b*) Does any part of it work under pressure, and how would you examine it as to its safety?

13. State the rules to be observed in bringing in and running electric conduits through a building.

14. What is the difference in a two-wire and three-wire system of electric lighting? Describe each.

15. (*a*) How would you start up an electric light plant on the Edison 3-wire system? (*b*) What precautions are necessary in starting a motor, either series or shunt, and why? (*c*) How would you manage to run some 16 C. P. incandescent lamps from an arc light circuit?

### Arithmetic.

1. Add 16895874328; 17968574636; 27893478928; 68594857384; 86958473827; 67858947896; 28394738294; 69584736288; 29384758399; 29384726373; 58695847734; 27834678297; 29384758393. 2. Multiply 47089 by 6087.

3. Divide 288179166 by 47289.

4. If there is a pressure of 12 lbs. to the square inch, what is the total pressure on a valve of 3 inches diameter?

5. What are the cubical contents of a room 12 feet high, 18 ft. 6 in. broad, and 20 ft. 4 in. long?

### Experience.

1. State what experience you have had in the erection and running of boiler plants.

2. State experience you have had in the erection and running of engines and machinery.

3. State how long you have had personal charge of engines and what kinds of engines they were.

4. Have you served time as an apprentice or are you a graduate of a technical school?

*5. State any other* facts which qualify you for the position *of Supervising* Engineer.

## Engineer Inspector.

### TECHNICAL.

1. State all the ways in which you would examine the notes of a closed survey to test its accuracy, both as to angular and linear measurements.

2. What is the fundamental requirement in all foundations to insure equality of settlement in all parts?

3. (*a*) What points have to be considered in determining the bearing power of piles in any given case? State this fully and clearly.

(*b*) State the circumstances, if any, where other than vertical forces must be considered.

4. Aside from construction and the wearing surface of streets and roads, what important considerations govern the design and execution of such works to insure permanency and freedom from unevenness in wear?

5. Suppose you were ordered to make hydrographic survey for several piers on the North River side of the city; state clearly how you would lay out the work, what you would do, and how you would do it. Illustrate by sketches if desired.

6. (*a*) Describe the method of making a survey of a reservoir site.

(*b*) State clearly the method of computing the cubical contents of such a reservoir up to the flow line.

7. (*a*) Having the angle of intersection and length of tangents given, show how you would lay out a simple railroad curve by use of transit instrument.

(*b*) Show at least one way of doing the same by use of chain or tape only.

8. *A culvert to* care for certain surface drainage is to be

built under a road; how would you determine the necessary site?

9. Describe the proper construction of a weir for measuring the flow of water, and the precautions to be observed in its use.

10. Suppose the upper surface of a dam to be vertical (*a*) state at what depth the centre of pressure of the water would be located. (*b*) State what the pressure per foot of length of the dam would be, taking the depth as (*a*).

11. What other ways are there for measuring the flow of water than by the use of weirs?

12. (*a*) Describe the action of the internal forces in a beam under transverse load. (*b*) Give the relation between a central load (P) and the unit strain (S) on a beam of length (l), depth (b) and width (w).

13. Describe what is meant by the term "shear" in computing the strength of bridges and how it is determined.

14. In riveted work the bearing value and the shearing value have both to be considered. (*a*) Describe the cases in which each may be the governing element in computing the strength of the work. (*b*) About what values would you take for each?

15. Why is it desirable that the centre of pressure in masonry (as in the keystone of an arch) or in a foundation (as that of a retaining wall) should not lie outside of the middle third of the joint? Is such a condition necessarily fatal to the work?

## MATHEMATICS.

(NOTE: Show every figure.)

1. Compute the number of square yards of pavement in *a street 50 feet* between curbs and on a curve of 75° with a *radius of centre* line of 500 feet.

2. A rectangular field is 60 feet long and 40 feet wide, ıd is surrounded by a road of uniform width, having an ·ea equal to that of the field; what is the width of the road?

3. The populations of the upper and lower parts of a ›wn were equal, and after the former had fallen 20% and ıe latter risen 15%, the total number of inhabitants was 9,390. What was the population of each part at the first?

4. Extract the square root of 100.0200013.

5. Subtract the sum $a^2 - x^2 - \{a - x - (2x^2 - 4)\}$ and $^3 - x^3 - \{a + x - (a^2 - x^2 - 3)\}$ from $2x^2 - x^3$.

## Report.

Write a report on a new street of considerable length in ne of the annexed districts. Begin with the original surey, followed by the location, adoption of grades (with reaons for all conclusions), a schedule of quantities to be used ı the letting of the work, and inspection of grading, and f paving with granite block pavement.

## Assistant Engineer.

### Special Technical Paper.

The examination consists of five special papers, applyi as follows:

A. Department of Commissioner of Accounts.
Correction.
Finance.
Highways (except for bridge work).
Public Improvements.
Parks.
Taxes and Assessments.

B. Aqueduct Commissioners.
Department of Water Supply.

C. Department of Bridges.
Highways (for bridges).
East River Bridge Commission.

D. Department of Docks.

E. Department of Sewers.

Candidates may take one or more papers. Candida successfully passing papers B, D, and E will be eligible appointment to departments covered by paper A.

Ordinary reference books, slide rules, etc., may be use

## Assistant Engineer—Fifth Grade.

### A. Highways, Parks, etc.

1. Give your age and the training and experience you have had in trigonometrical surveys, roadmaking, drainage of lands, grading, paving, park work, and topographical work.

2. (*a*) Why is not the running of lines by the magnetic needle an accurate method? (*b*) What is the reason, if any, for taking the magnetic bearing of lines in making survey?

3. (*a*) What kinds of street pavements are now in use in city work? (*b*) Describe each briefly, and state the conditions it is best calculated to meet.

4. Describe briefly (*a*) rubble masonry; (*b*) ashlar masonry; (*c*) and state the classes of engineering structures for which these and also brick masonry and concrete are each adapted.

5. Suppose you have to fill for a street or railway across a stagnant pool, the bottom of which is soft and yielding for a very considerable depth, what method would you pursue?

6. Describe the method for laying out a curve for a street railway, having given the angle of intersection and the point of curvature.

7. (*a*) In designing a retaining-wall for a street where it crosses a valley by an embankment, how would you proceed to determine its dimensions? (*b*) Show by diagram the position and direction of the resultants of the forces acting in a well-designed retaining-wall.

8. (*a*) What is the least grade that is desirable for gutters of a street? (*b*) Where the grade between two intersecting streets is too flat, by what expedient may better grades be obtained without disturbing the cross-streets?

## Assistant Engineer—Fifth Grade.

### B.—Aqueduct Commission—Water Supply.

1. Give your age, and the training and experience you have had in any form in connection with the design, construction, maintenance, and management of hydraulic works or water-works of any description.

2. (*a*) In what part of a stream is the velocity greatest? (*b*) On what functions or data does the velocity of any stream depend? (*c*) Describe the principal ways in which the average velocity in streams is obtained.

3. (*a*) State the maximum, minimum, and average rainfall in the Croton Valley. (*b*) State about the minimum depth of rain that can be stored in the dryest year.

4. In the construction of a dam in stone masonry to resist the passage of water through it, state minutely every precaution to be taken to make the dam itself water-tight.

5. Suppose the rock on which the dam is to be built to be seamy, and water to come up through crevices at various points; what would you do where the water was (*a*) in moderate quantity; (*b*) in large volumes?

6. How would you construct an earthen dam on gravelly soil, so as to insure tightness? Describe this fully.

7. (*a*) What is the pressure against the vertical face of a dam for a space of one foot wide and a depth of one foot below the surface? (*b*) What is the pressure on a surface one foot wide, of which the top is three feet below the surface and the bottom four feet below the surface? (*c*) At what proportion of the depth is the "centre of pressure" located in a rectangular vertical surface?

8. Suppose the quantity of water available for running a *water-wheel is 120* cubic feet a second, and that the available *head is 12 feet,* and the efficiency of the wheel is 80 per cent.

How many foot-pounds of work will the wheel yield, and how many horse-powers will this be?

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## Assistant Engineer—Fifth Grade.

### C. Bridge Engineer and Draughtsman.

TECHNICAL.

1. Make sketches showing at least five panels of the following styles of trusses: viz., Whipple (single intersection); Warren, or triangular; and bow-string. Indicate in each by heavy lines the parts which are in compression when the truss is uniformly loaded.

2. Take the case of a five-panel Whipple truss, and show which members are affected by a load on the second panel from one end, and the kind of strain produced in each.

3. What is "shear" in a truss, and how is it determined at any point?

4. The strength of a column depends upon the area of the metal section, the diameter, and the length. For columns of similar construction, give in general, for changes in each of these, the ratio in which the strength of a column will be affected.

5. Give a sketch of what you would consider the best method of attaching rod sway-braces to iron trusses.

6. How would you compute the strength of a riveted joint?

7. Suppose an abutment 15′ high to be required for a bridge 50′ wide over a running stream. Give a sketch of the same in plan and section, with full dimensions, such as you would deem necessary.

8. Suppose the ground in this case to be unsound; give a sketch of a pile foundation, giving everything up to the *tonework, with* dimensions.

9. A pine bridge is to be built on a 45-degrees skev 20-ft. roadway, with the view at some later date of dou the width of roadway. (*a*) How should trusses be arra for final economy of construction? (*b*) How many halv trusses must be independently calculated, and why?

10. In making a final inspection for acceptance o metal superstructure of a new pin highway, state points should receive attention.

11. In examining the condition of an old through bridge, state the important points of inspection as re (*a*) floor connections; (*b*) counters; (*c*) what for double t (*d*) what for four track?

12. What are proper unit strains to allow for me steel in the following member of highway bridges: (*a*) eral bracing (tension); (*b*) rolled beams used as floor-b (*c*) bottom chord-forged eye-bars; (*d*) bottom chord plates and shapes; (*e*) chord segments (compression)?

## Extra Paper.

1. What in your opinion, should distinguish (*a*) a general drawing; (*b*) a good detail drawing; and (*c*) a shop drawing?

2. What are least proper clearances to allow betwee shoe inside of end-post; (*b*) pin connected bridge; (*c*) 8' and pin-hole; (*d*) 2″ pin for material connection and hole?

3. Show by sketch the conventional signs for rivet- and rivets, including countersunk, flat-head, etc.

4. How shall a rivet be spaced (*a*) to another rivet; ( the leg of an angle; (*c*) why not closer?

5. What is the least proportion the depth of plate-gi should have to the span? (*b*) same for rolled beams us *stringers.*

6. *What should* be the actual size of punched rivet

for $\frac{7}{8}$" rivet? (*b*) What size is assumed in calculating net sections?

7. How close is it proper to space rivets in a diagonal line in a riveted tension member as compared with a transverse line?

8. Design and show by sketch a properly proportioned eye-bar head for a bar taking a strain of 250,000 lbs. Allow unit stress of 12,500 lbs. per sq. in.

9. Show graphically and compute analytically a pin required for panel point L2 where members and stresses are as follows:

L1 L2....2 eye-bars 260,000 lbs.
L2 U1....2 eye-bars 335,000 lbs. Diagonal at 45°.
L2 L3....4 eye-bars 450,000 lbs.
L2 U2....Post with webs spaced 16', 2,200,000 lbs.
Allowed bending 20,000 lbs. per sq. in., bearing 12,000 lbs.

10. Assume reasonable main sections and make calculations necessary for detail connection of stringer to floor-beam and hanger at end to pin for a floor-beam 16' long. Two stringers connect on each side spaced 7' centres, and transmitting 930,000 lbs. each.

11. Make complete shop drawing of above floor-beam, giving rivet of spacing and necessary dimensions; state reasonable unit stresses of main section and assumption for details.

12. Make neat tracing of above drawing.

13. Make a neat drawing of a nest of ten rollers, 3' long, $4\frac{1}{2}$" diameter, with all necessary details, including bottom bearing-plates.

14. Make neat, but not necessarily accurate, drawing of a stiff portal bracing with name-plate for a large through bridge span. Let this be ornamental.

15. Show your skill in lettering by arranging and showing *style of letters for* the following caption:

Elevation, Proposed East River Bridge, Number 4, Department of Bridges, City of New York, May 17, 1901.

MATHEMATICS.

1. Extract the square root of 9361.429 to four places of decimals.

2. Multiply .01629 by 47.3 and divide the product by 906.42. Give answer five places in decimals.

3. By logarithms multiply 43.972 by .0361 and divide the product by .0016.

4. A cast-iron column is 8″ outside diameter 1″ thickness of metal. What diameter of column with metal $\frac{3}{4}$″ thick will give the same area of cross-section of metal?

5. The panel length of a bridge is 21′ 0″, the length of diagonal 35″. What is the height of post and the sine of the angle of inclination from the vertical?

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## Assistant Engineer—Fifth Grade.

### D. Department of Docks.

1. State your age, and the training and experience you have had in any form in connection with the design, construction, and maintenance of wharves, docks, bulkheads, or other works of a similar nature.

2. Make a sketch of the typical section of bulkhead in use at present where the bottom is good and depth moderate, assume the depth and give an approximate calculation of the several forces acting both for and against stability, showing the directions and points of application of the resultants, and the moments of the forces. (It is not expected that this *will be exact, but* only sufficiently so to show knowledge of *the principles involved.*)

3. Make a sketch of the section adopted where the bottom is soft to a considerable depth, and without calculation explain fully the reasons for the adoption of the form, and how it is that safety is secured by it.

4. How would you proceed to determine the safe loads to apply upon piles in a given locality as calculated by the penetration, etc.? In what way do piles act to uphold loads?

5. Describe all the methods in use in dock building for determining the character of the earth strata down to rock at any point before beginning the building of a bulkhead.

6. Where is it necessary to lay concrete under water? How can it be done with good results?

7. Describe clearly and fully the process of cement testing in use in building under water.

8. Describe clearly and fully every part of the process of making one of the large concrete blocks in use in bulkheads, with every precaution needed for the best work.

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## Assistant Engineer—Fifth Grade.

### E. Department of Sewers.

1. Give your age, with the training and experience you have had in any form in connection with the design, construction, and maintenance of sewers.

2. Make careful sketches of a standard manhole at the intersection of a 12-inch and a 36-inch sewer, showing a vertical section across a sewer and a horizontal section at about the flow line.

3. Suppose a sewer district is to be laid out (the watershed having been determined and levels taken throughout), describe the method you would pursue in laying out the

trunk and subsidiary sewers and determining their dimensions.

4. (*a*) Under what circumstances is it desirable to use sewers of egg-shaped section? (*b*) What is the least velocity of flow desirable in sewers, and for what reason?

5. (*a*) About what is the heaviest rainfall for which sewers should provide in New York? (*b*) Is there any definite portion of this that enters the sewers, and if not, upon what factor or factors does the quantity to be provided for depend? (If you can do so, show how this is taken account of by the formulas for discharge or for sizes of sewers.)

6. (*a*) What is meant by "hydraulic" mean radius in a sewer? (*b*) Why does the resistance to flow from friction depend upon this?

7. Is the velocity in a sewer greater when it runs full than when half full, or how is it?

8. Describe the best bond for the brickwork in sewers and all other points to be observed in doing a first-class job in building a sewer.

## General Inspector of Streets and Roads.

TECHNICAL.

1. In the selection of the kind of covering to be used for a street (whether granite block, asphalt, or macadam), state the considerations or conditions that decide in each case.

2. As a rule, which do you think preferable, granite block, or trap block pavement (of same shaped blocks), and why?

3. What results may there be from lack of care in preparing the ground surface for a pavement?

4. (*a*) Under what conditions should you think it necessary that a highway be underdrained? (*b*) How should such a job be done?

5. State every defect to be looked for in the inspection of a lot of granite blocks.

6. Are defects ever found in concrete foundations for pavements, and if so, what are they?

7. State every defect to be looked for in the work of setting granite blocks; in other words, how would you inspect such a pavement?

8. In the work of refilling a trench cut for pipe-laying in a street, is it possible to do it so as to prevent all probability of settlement? If so, how should the men be distributed in the trench?

9. How would you make a quick test of cement to satisfy yourself that it is in good condition to use?

10. (*a*) In what way does wear show itself on a macadam pavement? (*b*) What are the causes of "raveling" of such pavements? (*c*) How can this be largely prevented?

11. (*a*) At what temperature should asphalt pavements be laid? (*b*) What are the results of a departure from this rule?

12. (*a*) Where (that is, in what part of the street) does water have the greatest effect upon an asphalt street surface? (*b*) Why is this the case?

13. In order to get the firmest adhesion of the asphalt to the surface below, either in new work or in making repair, what are the essentials?

14 and 15. Write a complete report upon the condition of three streets of considerable length which have been in use for some time, one paved with granite block, one with asphalt, and one with macadam, giving your recommendations in each case.

ARITHMETIC.

1. How many tiles 10 inches wide and 16 inches long would cover the floor of a dining-room 36 feet 6 inches long, and 26 feet 8 inches wide?

2. The circumference of a circular field is 1900.668 yards. What is its area?

3. Multiply the sum of 10.1 and 8.65 by their difference, and divide the product by 46.4.

4. How many cubic feet of stone block in a pavement 1 foot 3 inches deep, covering a space having two parallel sides 84 feet and 102 feet 6 inches and 74 feet deep?

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## Inspector of Regulating, Grading, and Paving.

TECHNICAL.

1. (*a*) In grading a street through rock, at what depth in reference to the finished surface of the street is the rock excavated to? (*b*) What is the reason for this?

2. In making a deep fill across a depression, which will make the most solid fill; to bring the bank up uniformly in layers, or to carry the grade across level by dumping from one end, and why?

3. (*a*) State the rule respecting the disposition of materials in a fill. (*b*) What is the reason for this?

4. *Where a fill* has been made of ordinary earth, gravel, *etc., is any allowance* made for settlement, and if so, about *what?*

5. Suppose several grade-pegs on a line to be lost, but one at either end to remain, how can you restore those lost with reasonable accuracy without the engineer's aid?

6. If inspecting a job of grading, what memoranda should you keep and include in your reports? State this in detail.

7. Where concrete is used in the foundation for a pavement, describe (*a*) the preparation of the ground before placing the concrete; (*b*) describe the best method of mixing the concrete; (*c*) describe the proper method of placing the concrete, joining new to old, and all precautions to be observed.

8. Describe a strictly first-class job on a Telford foundation, omitting all above the foundation.

9. Describe the finish of a Telford road, above the foundation, including the rolling, and how you tell when the rolling is completed.

10. (*a*) Describe a stone block such as is required for stone-block pavement in the city. (*b*) State all the defects for which you would reject stone blocks.

11. State all the rules to be observed by a pavior in selecting and placing stone blocks in position in a roadway.

12. State the requirements of proper ramming and "back-ramming."

13. Where tar is used in stone-block paving, state how you would determine whether it was of proper quality and in proper condition for use.

14. In making an asphalt roadway, at what temperature must the asphalt be to obtain good work?

15. In laying an asphalt roadway, name carefully all the points in which inattention to details may be detrimental to the durability of the roadway, or cause its rapid destruction.

ARITHMETIC.

1. Add 482396; 384576; 640985; 498764; 589787; 694539.

2. *Subtract* 289698 from 532074.

3. *Multiply* 7896045 by 40876.

4. How many cubic feet of masonry are there in a solid wall 28 feet 8 inches long, 9 feet 10 inches high, and 5 feet 4 inches broad?

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## Superintendent of Encumbrances.

### Duties.

1. (*a*) Give briefly, in a general way, the meaning of an encumbrance with reference to the public highways in New York City. (*b*) Upon what public officer under the charter rests the responsibility for keeping highways free from encumbrances, and, territorially, what is the extent of his jurisdiction? (*c*) What official relation has the Commissioner of Public Works to the Borough President?

2. (*a*) Briefly, how would you determine whether an object on the public highway was or was not an encumbrance? (*b*) What permanent obstructions are frequently encountered in the streets of New York City, and briefly, by what right, or by whose authority, are they there? (*c*) What public officer, if any, has the power to grant permits for the placing of obstructions on the public highways? (*d*) What is a law and what is an ordinance, and what public bodies are charged with the making of laws and of ordinances? (*e*) What is the penalty for encumbering the highways of the city?

3. (*a*) Briefly, if you were Superintendent of Encumbrances, and dividing your territory into districts of inspection, what established lines, if any, would you follow, and why? (*b*) Having learned of an encumbrance through an inspector, state briefly how you would handle the matter so as to do away with the encumbrance and produce the least amount of trouble to the owners thereof. (*c*) Briefly, what *system of records* would you keep?

4. (*a*) *If a builder* puts materials on a much-travelled highway, *what precaution* must he take with reference to pave

ments, gutters, fireplugs, and sidewalks? (*b*) What precaution to guard the public against accident? (*c*) On what authority would you enforce the taking of the precaution referred to, and would your course be the same in each of the five boroughs?

5. (*a*) Briefly, how much of a public highway may a storekeeper use for the display of his goods or wares in each of the five boroughs?

6. (*a*) What are the regulations for awnings and awning-posts, and how do they vary, if at all, for each of the five boroughs? (*b*) How far may bow-windows extend beyond the building line in each of the five boroughs?

7. (*a*) How far may stoops extend upon the streets in each of the five boroughs? (*b*) Give a few instances in which hanging signs may be encumbrances, and state briefly the regulations with reference to signs in each of the five boroughs.

8. (*a*) Bound in a general way each of the five boroughs. (*b*) State the different kinds of pavements used in each borough.

9. Write a letter of not more han 150 words, addressed to the Corporation Counsel, telling him of a dangerous encumbrance you have removed, and the different steps taken by you in securing its removal.

## Arithmetic.

1. Multiply 17.089 by 169.08.

2. Divide 29.12238 by 478.2.

3. A grocer received $24 for the sale of sugar in one day. Of this sum 12% was gain. What was his gain per cent., and what the actual gain on a sale amounting to $275?

4. *What per cent.* of 90 is 270?

## Mechanical Engineer—(L. I. Water Supply).

### Mechanical.

1. Name all the principal parts in a compound condensi pumping engine.

2. Suppose a set of boilers to be old and more or l weakened by use, state what special care you would take as to insure safe running.

3. (*a*) How often would you examine them?

(*b*) State how you would examine them.

4. In a boiler which must be kept running, what co you do in case you found a weak place in it?

5. (*a*) Suppose air to collect in a force main of a wa plant, what effect does it have on the pumps, if any? Suppose it to collect on the suction side of the pump, wh is the effect?

6. Name all the special difficulties that may arise in pum ing water from driven wells.

7. Does the same amount of water come from every w of a system? and if not, how can you manage to make yc pumps work smoothly?

8. Describe one of those wells and the way in which we are connected up for pumping.

9. What two effects may follow too rapid pumping fr a well?

10. Aside from difficulties connected with the wells, wh troubles may arise at the pumps, particularly the valve (State clearly.)

11. Are any precautions needed in running such an e *gine in very cold* weather? If so, state them fully.

*12. (a) Is there* any way in which you can estimate *quantity you are* pumping per day? If so, describ

(*b*) What is "slip" in a pumping engine, and how does it affect the quantity pumped?

13. Suppose you found you were drawing too heavily on one or more of the wells, what would you do?

14. Suppose a boiler tube to split, and you were obliged to keep running, what would you do?

15. Describe the proper method of firing boilers and so controlling fires as to get the most steam from a given amount of coal.

ARITHMETIC.

1. Add 9′ 11½″; 7′ 8″; 5′ 4¾″; 18′ 5⅝″.
2. Subtract 17′ 3¾″ from 25′ 1½″.
3. Multiply 78096 by 5084.
4. Divide 4791658 by 7894.

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## Inspector of Water-Meters and Water Consumption.

TECHNICAL.

1. (*a*) Describe a disc meter and the means by which its motion is transmitted to the recording dials. (*b*) Give the names of the different styles or patents of disc meters in use in the city.

2. In what ways are mistakes made in setting meters?

3. Does the location and kind of service have anything to do with a meter continuing to give correct readings, and if so, state clearly how.

4. What precautions are necessary in attaching meters for measuring feed-water to boilers, and why?

5. *Can a piston* meter register more water than actually *passes through it?* and if so, explain how it can do this.

6. Within what per cent. of the exact amount passing would you expect any kind of metre to register when in actual use, and why would you consider such error, if any, allowable?

7. Without testing a meter, how would you make a good guess as to whether it was registering correctly?

8. Is it ever necessary for a meter inspector to refer to the records of the Department, and if so, for what purpose or purposes?

9. Under what conditions only is the use of hose for washing walks, etc., permitted?

10. In reporting upon the fixtures, etc., for water-supply in a building and their condition, name every item such a report should cover (omitting water-closets).

11. How is water taken by water-boats reported, and what is your duty in this connection?

12. How is water furnished to steamships measured, or amount of payment determined, and what is your duty in the matter?

13. Is water ever taken fraudulently by sailing craft of any kind? If so, state the several ways.

14. Write a daily report such as is required, respecting the water supplied to shipping of every kind.

15. Read all the meter dials furnished and record the readings, being particularly careful to set down every cipher required to fully express the reading.

## Topographical Draughtsman.

TECHNICAL.

1. (*a*) What drawings does a topographical draughtsman have to make?

(*b*) Suppose these were notes of a closed survey of a field, how would he examine them as to their reasonable correctness?

2. If errors are found in latitudes and departures (*a*) how would tabular corrections be applied? (*b*) How can the amount and direction to be applied at the end of each course be determined graphically?

3. (*a*) If the course and length of one side be missing how can it be supplied? (*b*) Is any assumption made by doing this, and if so, what is it?

4. (*a*) How many square chains, (of 66 feet per chain) are there in an acre? (*b*) How many square feet are there in an acre?

5. How should a drawing of a survey be located on the paper?

6. (*a*) When a transit survey of a street or other continuous survey of considerable length, and with a number of angles in it, is to be plotted, what method should be pursued to avoid as far as possible errors in plotting? (*b*) What is the most accurate method of laying off an angle on paper?

7. Illustrate all the ways of indicating either by description or otherwise, the scale to which a drawing is made.

8. In a reverse curve, are there any trigonometrical lines common to the two branches of the curve, and if so, what are they?

9–10. Make a careful trigonometrical drawing about 2 inches square, in your best style, of a portion of a hill, containing *two ravines* or depressions approximately parallel,

starting from nothing a little below the top and reaching a considerable depth before debouching upon the plain below. A swelling ridge to occupy the space between the ravines. All slopes to be represented by hachures.

11-12. Make a careful topographical drawing 2 inches square of a reservoir and dam, with wide stream above and below.

13-14. Draw the same of a farm, with one-quarter in evergreen trees, one-quarter in hard-wood trees; the rest showing buildings, orchard meadows, etc.

15. Show your skill in lettering and arrangement by drawing a caption to a drawing as follows:

"Map of a part of the Borough of the Bronx.
March, 1902.
Scale 100 ft. per inch."

ARITHMETIC.

1. Compute the ares of a hexagon of which the radius of the circumscribed circle is 11 feet.

2. Extract the square root of the following number 70913.078.

3. Find the sum of $3\frac{3}{8} + 4\frac{1}{8} + 1$ 11-40 + 3 18-265 and express the fractional portion in decimals.

4. A field is trapezoidal in shape with one end at right angles to the two parallel sides. The parallel sides are respectively 713 feet and 1619 feet long, and the inclined end has a length of 1278 feet. What is the area of the field?

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## Ornamental Iron Draughtsman.

TECHNICAL.

1. What unit stresses do you consider proper for (*a*) *medium steel in* built girders; (b) rolled beams used as floor *beams.*

2. Same for cast-iron (*a*) in tension; (*b*) in compression.

3. Same for rivets in (*a*) shear; (*b*) bearing.

4. Discuss briefly the comparative merits of wrought steel and cast-iron columns for structural purposes.

5. What are the maximum moment and reactions of a girder 20 feet long with a concentrated load in centre of 15,000 lbs. and a uniform load of 2000 lbs. per lineal foot of girder?

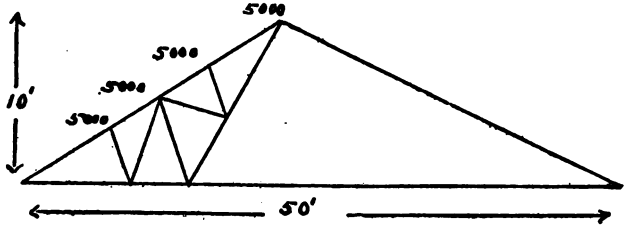
6. What is the required section of the lower chord of above girder when effective depth is 2 feet and allowable tension per square inch as answered in Question 1?

7. Determine spacing of rivets in chords near end support, showing method of calculation when web is $\frac{3}{8}''$ thick, and strain allowed for rivets as per answer to Question 3.

8. Make a free-hand sketch of stair string with ornamental railing, showing newel.

9. Make a free-hand sketch for detail of stair string connection at top and bottom of stairs.

10 and 11. Determine strains (graphically and analytically) of roof truss shown below.




12. Show by sketch or describe a method of vault lighting by use of prisms, and state under what conditions they can be used.

13. Make free-hand sketches of (a) a finial; (b) a gargoyle; *(c) a corbel.*

14. Show by sketch a (*a*) Doric, and (*b*) an Ionic column

15. Make a free-hand sketch of a wrought-iron grille fo ticket-office window.

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## Architectural Draughtsman.

### Technical.

1. Make a pencil sketch of a dormer window, showing portion of the sloping roof.

2. Make sketches of the capital and base of each of t principal architectural orders.

3. Make a sketch of one-half of the pediment of one of t orders, and state which it is.

4. Make sketches of the sections of built iron columns follows: of Z bars and plates; of channels and plates.

5. Show by sketch the method of splicing a Z bar colun at a point where the sections above are reduced.

6. Make sketches of two sections of the most used fi proof floors, showing 2 panels of each.

7. State what loads are used per square foot for offi floors, school-floors, and floors for warehouses for heavy gooc

8. Is it sufficient in designing a floor to consider only t supporting power of the beams, or is there a limit to t loading for some other cause, and if so, what?

9. What points would you be particular about in maki a drawing for an iron casting requiring great strength, so to obtain homogeneity, freedom from internal strains, etc.

10. Make a sketch showing the timbering around a chi *ney-breast,* and the proper method of supporting the hear *to an open fireplace.*

*11. Suppose* there are knots in one edge of a wooden

beam, does it make any difference whether that edge is placed up or down, and why?

12. Make a sketch of the front of a fire-engine building.

## ARITHMETIC.

1. A building is 80 feet long; the roof has a pitch of 6 feet. What is the length of the roof?

2. A cone-shaped tank has a depth of 9 feet, the bottom diameter is 11 feet, and its top diameter is 7¼ feet. How many gallons of 231 cubic inches will it contain?

3. A cellar has on one street a length of 137 feet, and on a parallel street a length of 107 feet 8 inches. The perpendicular distance between the streets is 98 feet 6 inches. How many cubic yards of excavation would there be if the depth be 22 feet with vertical sides?

4. A brick segmental arch subtends an angle of 68°. The radius of the intrados is 30 feet, the radial depth is 3 bricks laid rowlock, length is 5 feet. How many bricks required?

## Inspector of Masonry.

TECHNICAL.

1. Where granite is to be used for a massive retaining wall or a dam, how would you inspect the stone as to its quality in everything which may affect its durability or its power to bear loads, and what would you look for?

2. What defects would you look for (in stone for the same uses) in (*a*) limestone; (*b*) sandstone?

3. State the differences between (*a*) good and poor brick and how they are examined; (*b*) the same for sand.

4. (*a*) Having no testing machine, state how you can satisfy yourself that a barrel of cement is in good condition and safe to use. (*b*) How would you place cement in barrels where no sheds are available, so as to prevent probable damage?

5. (*a*) Suppose in excavating for the foundation of a wall to carry a heavy load, a ledge of rock is struck, what examinations would you make? (*b*) Suppose the rock to be steeply inclined, what would you require before starting the wall?

6. Suppose a wall is to be founded on earth and the excavation is completed, what would you do in preparation before placing anything upon the earth.

7. Can concrete for a foundation be placed in water where to do otherwise would be very difficult, and if so, how is it done, and what precautions are taken?

8. Describe clearly the different kinds of (*a*) rubble masonry; (*b*) ashlar work; (*c*) six-cut work.

9. (*a*) For the strongest and tightest work what thickness of bed-joints do you think best? Give reasons for your opinion.

10. To get the best adhesion of cement to stone and the

tightest work, what are the essential things to be attended to in laying the stone?

11. How are the very thin joints made in laying up fine cut stones in the fronts of buildings?

12. When the beds of stones are only pitched true, and joints half an inch thick are provided for, describe the operation of setting the stones in such a way that you are certain to fill all space in the beds with mortar.

13. Describe the face bond you would require in heavy stonework with courses one to two feet thick; particularly as to the horizontal distance between vertical joints in adjacent courses.

14. Where the stones in such a job are cut full to dimensions at the back as well as the front, how would you fill the vertical joints to get the best job, supposing them to be about ½ inch thick?

15. For such stonework describe fully and clearly just how you would do the pointing to get the best work possible.

## ARITHMETIC.

1. How many square feet in a floor 83 feet long, 37 feet wide at one end, and 23 feet wide at the other, the ends being parallel?

2. A circular cistern 11 feet deep and 65 feet in diameter is of how many cubic feet in capacity?

3. If a pile of bricks is 19 feet long, 9 feet high, 5 feet 3 inches wide at the base, and 3 feet 6 inches at the top, how many bricks $8 \times 4 \times 2$ does it contain?

4. A certain excavation costs $75. What would be the cost of an excavation 20% wider, 25% deeper, and 50% longer?

5. *A man* owed $60,500; but being unable to pay in full, *settled for $44,770;* what per cent. of his debt did he pay?

EXPERIENCE.

Applicant is asked to state nature and details of employment as mason, or foreman, inspector, or boss of masons.

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## Inspector of Steel.

TECHNICAL.

1. How should specimens for testing be chosen and prepared to fairly show the quality of (*a*) wrought-iron; (*b*) cast-iron?

2. What conditions or quality of material or manufacture are indicated by the following tensile test results: (*a*) Elastic limit 38,000 lbs. per sq. inch, and ultimate strength 45,000 lbs. per sq. in. (*b*) Ultimate strength 80,000 lbs. elongation in 8″ 10%? (*c*) Ultimate strength 80,000 lbs. elongation in 8″ 25%? (*d*) Ultimate strength 56,000 lbs. elongation in 8″ 35%?

3. What is the object of each of the following tests of wrought steel: (*a*) Cold bend; (*b*) hot bend; (*c*) quench and bend; (*d*) drift?

4. (*a*) Describe all the necessary details of surface examination of material. (*b*) State defects likely to be found in both steel and cast-iron.

5. How are sections of the following forms checked: (*a*) Angles; (*b*) T's; (*c*) wide-sheared plates?

6. What is (*a*) piping; (*b*) "burning"; (*c*) how do you inspect to discover them?

7. What are the essential points to be inspected about the following processes: (*a*) Punching; (*b*) assembling?

8. (*a*) The same with riveting; (b) how are loose rivets made to seem tight under a hammer test; (c) how would you now deceit was practised?

9. State all the details to be inspected of a girder of a finished plate-girder bridge span.

10. Same of a finished post of a pin-connected span.

11. How would you check the field connections of (*a*) a skewed portal; (*b*) a lattice girder of which members are shipped separately?

12. What are the important points to be inspected about painting to secure thorough preservation from rust?

13. Describe details of inspection of all points of a stringer floor-beam connection.

14. In first-class work what variations are allowable in the following: (*a*) Pin and pinhole connection; (*b*) riveted connection; (*c*) length of stringer; (*d*) length of floor beam; (*e*) length of eye-bar; how should the last be measured?

15. How should a 16″ × ⅜″ universal mill-plate 30 ft. long bowed in plans of its width (not buckled) be straightened; how, if buckled?

## Arithmetic.

1. The dimensions of area of a test piece are 1.015″ × .637″. The testing machine shows elastic limit 22,080 lbs. and ultimate strength 40,250 lbs. The reduced area is .843″ × .421″, and the elongation in 8″ is 2.84″: (*a*) What are the elastic limit and ultimate strength in lbs. per sq. inch; (*b*) what is the per cent. of reduction of area, and (*c*) what is the per cent. of elongation?

2. How much heavier is a 6″ round bar than a 2″ round bar, each 1 foot long? (Allow .23⅓ lbs. to a cubic inch.)

3. The total weight of a steel viaduct is 563 tons 478 lbs. ⅔ is girders, ⅓ is columns, 1/9 is bases, and the balance miscellaneous rods, etc. How much does each class of members weigh?

4. *A plate* 12″ × ¾″ has a ⅞″ rivet hole punched in it. *What per cent.* of section is removed?

## Inspector of Sewer Connections.

### Technical.

1. At what height must a sewer connection be inserted in a brick sewer? Why do you think this necessary?

2. How often are spur connections made with sewers?

3. In inserting a spur in a brick sewer is there any rule as to its direction, and the method of finishing the work, and if so, what is it?

4. What size is the regular spur for house draining?

5. How many houses are allowed to drain into one spur?

6. Are larger spurs allowed, and if so, under what rule?

7. Does the inspector of connections have any authority over the laying of the house sewer in the street? If so, what? Where does his authority end?

8. What report as an Inspector would you make; give the items.

9. How are the house connections located so that they can be found again?

10. Would you think it your duty to take any notice of the condition of a sewer, or of the pavement?

11. Give any other details as to your duties, which are not called for by the previous questions.

### Arithmetic.

1. Add 1234562; 9876; 278349; 968; 7865; 2678394; 2738492.

2. Subtract 367842 from 478096.

3. Multiply 76954 by 4097.

4. Divide 1676044 by 2347.

## Promotion Stoker to Engineman.

TECHNICAL.

1-3. (*a*) Have you served an apprenticeship at a mechani- business? If so, at what business? Where were you em-)yed? How long did you serve? When did you complete ? term of apprenticeship? (*b*) Since your apprenticeship, any, what employment have you had? (*c*) How long have u had charge of boilers, and what was the size of the iler plant in your charge? (*d*) What experience have you d in running pumping engines; that is, how long have you n them? What was the character of the plant?

4. (*a*) Is there any limit to the distance a pump can be ; above the water to be lifted by suction, and if so, what the greatest practical height? (*b*) Why is this so?

5. What do you understand is meant by the "slip" of a mp?

6. Describe the troubles from every cause whatever that u have known to arise at the intake valves of a pumping gine.

7. Describe the intake valves.

8. (*a*) How are shocks prevented in either the suction or rce mains? (*b*) What care, if any, does this part of the ınt require, and why?

9. (*a*) How would you test the steam-piston for tightness the cylinder? (*b*) If it leaks steam, what would you do?

10. (*a*) What are the most essential things for an engine- ın to attend to when first coming on for his daily tour of ty? (*b*) What would you do in starting a cold engine?

11. What would you do in case you found your water in ilers very low and your fire hot?

*12. Is a boiler* ever damaged by improper firing? and if *explain how* and why.

ARITHMETIC.

1. Add 789653; 978687; 769842; 327984; 695878.
2. Subtract 509878 from 702347.
3. Multiply 47089 by 6094.
4. How many pounds of pressure at 12 pounds to the square inch in a safety-valve 4 inches in diameter?

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## Stationary Engineman.

TECHNICAL.

1. (*a*) What is meant by the "lead" of an engine-valve?
(*b*) What good purpose is served by the lead?
(*c*) What is the difference between "inside" lead and "outside" lead?
2. (*a*) How do you line up an engine?
(*b*) What would lead you to think that lining up is necessary?
3. What effects does the "lap" of an engine-valve produce?
4. (*a*) In starting up work with a cold boiler, state just what examinations you would make, what you would do, and just how you would do everything in the best way. (*b*) What mischief, if any, may be caused by lack of attention or care in this?
5. In starting work with your engine in the morning, state everything to be done to the engine and in the engine-room.
6. In closing down work with a steam plant and an engine on the evening of a very cold night, state everything to be *done.*
7. *State all the* ways in which firemen waste coal, or fail *to use it to the* best effect.

8. What effect does the slipping of the belt to the gov-
ıor of an engine have upon the engine?
). (*a*) Where the water from a condenser is used again in
oiler, and it contains more or less oil, will this have any
ct on the boiler, and if so, how does it act? (*b*) Is the
er from a condenser ever treated in any way before so
ng it, and if so, how?
0. (*a*) Describe the form of metallic packing for engine
ons most commonly used. (*b*) State what you would do
ou found such a piston to be leaking.
1. What stoppages are likely to arise in the valves or
es supplying feed-water from the city mains?
2. Describe, if you can, the steam-valves of a Corliss en-
e and how they are operated.
3. When knocking is caused by lost motion in any part
an engine, how would you look for it, and how remove it?
4. Where a strap brake is used on the drum of a hoisting-
gine, what causes may there be for the brake becoming
re or less defective in its holding power?
15. What causes are there for "hammering" in steam-
es?

### Arithmetic.

1. Add 89784; 67957; 93748; 84687; 79687.
2. Multiply 8 yards, 2 feet, 9 inches by 317.
3. How many cubic feet of space in a room 18 feet 8
hes broad, 25 feet 6 inches long, and 12 feet high?
4. Divide 343096875 by 84967.

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## Janitor-Engineer.

### Management of Boiler.

1. *State what engine* or engines you have had in your en-
*charge, and* describe them in a general way.

2. State all the ways in which injectors may cease to act or may act badly, and give the reasons for such difficulties.

3. (*a*) Is it a good or a bad plan to open the fire-door to a boiler to govern the draught? (*b*) Give clearly your reasons for so thinking.

4. Suppose a boiler to be hot and the water low, does it have any effect to fill it rapidly under such conditions? If so, what is the effect?

5. (*a*) Describe all the reasons there may be for the main-bearings to an engine running hot. (*b*) State what you would do if you found this bearing to be running hot.

6. (*a*) Does the governor of an engine ever get out of order, or cease to act? (*b*) If so, state how.

7. What causes may there be for the blowing off of a cylinder-head?

8. Is it ever necessary for an engineman to take off the cylinder-head of his engine? If so, for what reasons, and what examinations should be made?

9. What do you understand by the term "lap," as applied to an engine, and what is accomplished by it?

10. Does a change in the wind make any difference in the distribution of heat to the several rooms in a building? If so, what, and how can you correct it?

11. What is the best kind of packing for the valves on steam-heaters, and what is it made of?

12. (*a*) Is there any difference in the effect of the various kinds of oils on boilers? (*b*) What are the effects? (*c*) Is there any kind of oil that acts as a preservative?

13. What is the object of lifting the safety-valve of a boiler, and why is it done?

14. In order to get the greatest amount of heat from the *coal burning* under a boiler, how should the fire be managed?

*15. When* a boiler is set in brickwork, where would you *expect to find* rust on the exterior?

### General Paper.

1. Apart from the required character and ability, what do you consider to be the most essential qualifications for the position? Why?

2. Suppose the water-main which supplies your school should freeze, what would you do?

3. You find an unruly woman talking in a disorderly way to a crowd of children in a hallway. What would you do?

4. State fully what would be your method of supervision of closets and hallways, both in and out of school hours.

5. A portion of a stairway is found to be in a dangerous condition. Write a report of the case, and your action, to the proper authority.

### Arithmetic.

1. Add 478955; 892377; 764985; 432679; 875377.
2. Subtract 530988 from 820437.
3. Multiply 79086 by 5087.
4. Divide 2306752 by 3794.

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## Janitor.

### Duties.

1. In the building where you are employed as janitor some of the halls have marble floors, others have floors of hard pine, with runners of coarse matting. How would you keep such floors clean? Give methods for each kind of floor for a single week.

2. In your building there are several large offices, each occupied daily by fifty or more clerks or other employees of the *city. How* should such offices be cared for night and *morning, before* and after office hours?

3. Would a large city building be more likely to rece proper care where the janitor hires and pays his own m or where the subordinates are furnished and paid by Department of Buildings, Lighting, and Supplies? G reasons for your answer.

4. To what extent should a janitor be held responsible the care of chairs, tables, and other furniture of a build where he is employed?

5. In a building like the City Hall or a Court-House, the janitor the right to interfere in a quarrel between zens not in his employ? Give reasons for your answer.

6. At what temperature out of doors do you think heating apparatus of a public building should be started in the autumn? Should this question be left for deci to the janitor or not? What is the lowest temperatur lowable with safety in a court-room when business is g on?

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NOTE: For "Arithmetic" and "Experience," see "J tor-Engineer" preceding.

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## Steam Engineman.

GENERAL PAPER.

1. (*a*) Describe the way to manage a fire under a b where soft coal is used, so as to consume the smoke. Describe also the way to manage the fire where anthr or semi-bituminous coal is used, so as to get the most from it.

2. (*a*) What are the causes of external corrosion of *ers, and* (*b*) where would you look for such corrosion?

*3. (a) What* are the ways in which internal corr *affects a boiler?* (*b*) If you mistrusted that a boil

wasted so as to be dangerously thin at any point, how would you determine it?

4. (*a*) Suppose the brickwork around a boiler to be in such a condition as to allow more or less air to pass through, would it have any bad effect, and if so, what? (*b*) How could you tell whether air passed through the brickwork of a boiler in use?

5. (*a*) State what care, if any, should be given to the cocks, gauges, and glasses on a boiler. (*b*) State the same respecting the safety-valve.

6. (*a*) Suppose you have your boiler under full steam, and you desire to make a thorough inspection of it, inside and out, state all the steps you would take, and just what you would do. (*b*) State how you would manage the starting up after cleaning.

7. In laying up a boiler, say for the winter, state what you would do to keep it from damage in any way.

8. Describe what is known as "metallic" packing.

9. (*a*) In starting up an engine for the day, what precautions are necessary, and what points require the attention of the engineman? (*b*) State the same on stopping work on a cold night.

10. What is meant by the expression "lining up" an engine, and what may make this necessary to an engine in use?

11. Is there any wear to the piston and cylinder of an engine requiring the attention of an engineman, and if so, what, and how is it remedied?

12. What other parts of an engine require similar attention from wear? Describe fully.

13. What repairs does an engineman have at times to make to his feed-pump?

14. *What troubles* arise from the use of injectors where *used to feed boilers?*

15. Do lubricators on engine-bearings ever fail to act, and if so, from what cause?

ARITHMETIC.

1. Add 47848; 64832; 94786; 87963; 29844.

2. Subtract 18 feet 11¾ inches from 25 feet 7 inches.

3. How many square feet in a room 18 feet 6 inches by 23 feet 8 inches?

4. Divide 312516414 by 76842.

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## Pile-Driving Engineman.

TECHNICAL.

1. (*a*) How long have you run an engine on a pile-driving machine? (*b*) State the place or places where this was done and the character of the work.

2. Describe the machinery on a pile-driver, such as is used in the Dock Department of New York.

3. Describe the most active cause of deterioration in the boilers for such a machine, and where you look for trouble with the boilers.

4. (*a*) What is the appearance of a boiler fire when it is doing its best work? (*b*) What is its appearance when it needs attention? (*c*) Is there such a thing as disturbing a fire too much, and if so, in what way and for what reason?

5. (*a*) State everything you should do in connection with the safety-valve. (*b*) State why you should do these things.

6. Describe the very best way of blowing off a boiler when you wish to cool it off entirely, and give your reasons.

7. If, for any reason, your water was too low and steam high with a hot fire, what would you do?

8. Is it, or is it not, a good thing to control the draught *by using the* fire-door? Give your reasons for thinking as *you do?*

9. What is "back-lash" in machinery?

10. To what accidents are the engine, hoisting-drums, and other machinery on a pile-driver most frequently subject?

11. Describe the method of hoisting and releasing the hammer as ordinarily practiced in driving a pile, and whether there is any danger to men or machinery in doing this, as a result of lack of care in handling the engine. State all clearly.

12. In handling the piles in placing them in position, in what ways, if any, may accidents occur?

13. (*a*) What would make you suspect that a hoisting-rope was becoming too much worn for safe use? (*b*) How would you examine such a rope?

14. Have you ever used salt water in a boiler, and if obliged to, how did you manage it?

15. If the brasses on the cross-head of an engine should become worn, could you do anything to make them good, and if so, what?

ARITHMETIC.

1. Add 87944; 68796; 76983; 87899; 76486.

2. Subtract $7\frac{1}{3}$ inches from $11\frac{1}{2}$ inches.

3. How many square feet in a park 3795 feet long by $509\frac{1}{2}$ feet wide?

4. Divide 2879352 by 4728.

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## Steam Locomobile Engineman.

TECHNICAL.

1. Name the parts which every steam-locomobile must have, that is, those which are essential (*a*) (starting with the fuel, *etc.), for the* development, and (*b*) *for the application of the power; omitting* body and running-gear.

2. (*a*) Describe the boiler carefully, and state why this form of construction is adopted. (*b*) Is any special care required in taking water supply and fuel supply?

3. (*a*) Describe the method of supplying the fuel to the burners. (*b*) Describe the burner carefully; also, if you can, state why it develops such intense heat.

4. Describe the automatic regulator of the supply of fuel to the burner, and also explain its action clearly.

5. (*a*) Describe the boiler feed apparatus. (*b*) Is it constant in its action? (*c*) What is to be done when the boiler is full? (*d*) Are there any check-valves in the supply and what is their object?

6. How can you be sure that the water column always shows the true height of the water in the boiler?

7. (*a*) What provision is there for deadening the noise from the exhaust? (*b*) Explain its construction, and its action.

8. Explain everything to be done to supply a machine with fuel and water, and to get up steam ready for travel.

9. Describe completely everything you should do in the care of an automobile in all its parts, to keep it up to its full efficiency.

10. Describe the engine with sufficient fullness to show your knowledge of it.

11. Suppose your machine does not make steam as it should, state clearly what examination you would make, and where you would look for the trouble?

12. Suppose the gasoline pipe to break, what would you do?

13. (*a*) What is the use of the compensating gear? (*b*) Describe this gear.

14. State your knowledge of speed and lamp regulation *in New York City.*

*15. Illustrate* by sketches the safe and proper course

turning into a cross-street; (*a*) to the right; (*b*) to the left; (*c*) also as to passing any vehicle in front of you. (*d*) What other important precautions must the driver take in traveling in public streets?

ARITHMETIC.

1. Add 789657; 893767; 985899; 789986; 985698.
2. Subtract 589088 from 932047.
3. Multiply 60789 by 4097.
4. Divide 2672987 by 4389.

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## Marine Engineman.

TECHNICAL.

1. (*a*) Describe the apparatus by which water is supplied to the boilers in use on the boats with which you are acquainted. (*b*) State all the troubles which may interfere with the proper working of this apparatus.

2. What parts of marine boilers are most subject to rust on the outside, and why is this so?

3. State all the conditions which may make the indications of the height of water in the boiler, as shown by the water-column, deceptive.

4. (*a*) What is the surface blow-off cock used for, and how frequently ought it to be used? (*b*) State the same for the bottom blow-off.

5. In making a thorough inspection of the inside of a boiler, how would you make it, and what would you look for?

6. State what effect oil or greases in a boiler may have upon the boiler itself.

7. Describe the propeller shaft in one of the largest boats *belonging to the city*, and also the several bearings.

8. Do these bearings ever run hot, and if so, from what causes, and what should the engineman do?

9. Suppose the slide-valve in an engine to leak, what would you do to make it true and tight?

10. Does a piston ever leak steam? if so, from what cause, and how would you examine for it?

11. Does any part of a piston ever become loose, and if so, what may be the result?

12. What do you understand by the "lead" of the steam-valve to an engine, and what is its object?

13. Describe the several ways in which steam is condensed from engines on the city boats.

14. (*a*) Where low-pressure engines are used, state what vacuum is maintained. (*b*) State what is meant by this amount of vacuum.

15. In what ways may a careless fireman damage a boiler? (Name all you can think of.)

## ARITHMETIC.

1. Add 764836; 946872; 349765; 487654; 978649.

2. Subtract 209848 from 403227.

3. Multiply 67094 by 7056.

4. Divide 2392368 by 4728.

5. A safety-valve is 3 inches in diameter. If there is a pressure of 10 lbs. to the square inch, what is the total pressure on the valve?

## Building Inspector—Masonry and Carpentry.

### Oral.

Note: The oral examination consists of the following questions in reference to diagrams placed before the applicant:

1. What is the extreme depth of this foundation below the curb? (See foundation.)
2. What is the width of concrete at base at front of area inside of curb?
3. How are the wall columns at the sides of the building supported at the base? (See cross-section—rear elevation.)
4. What are small white squares in the sidewalks? (See floor plans.)
5. What are the two larger white openings shown in plans near right front corner. (Vents.)
6. What are the partitions around elevators and stairs constructed of?
7. Point out the different materials and name them.
8. What is this a drawing of? (Blue print of cantilever.)
9. Which of the columns supports the side wall?
10. Describe the centre columns in rear wall of the tenth story of this building.

### Technical.

1. Describe the characteristics of good concrete for foundations, including method of selecting the materials, mixing and laying them: (*a*) Size and shape of stone; (*b*) quality of sand; (*c*) condition of cement; (*d*) manner of mixing; (*e*) manner of putting in place.
2. What preparation do the masons make for the setting *of iron beams?*
3. *Describe the* process of setting a heavy support an

massive brick pier, capable of supporting very heavy load (*a*) Dressing of the stone; (*b*) laying the mortar; (*c*) placi the stone; (*d*) how can you tell if the stone is solidly bedde (*e*) what should be done to prepare the top of the pier and t bed of the stone, before the mortar is used?

4. Where an iron girder is used instead of a wall to su port the ends of wooden floor beams, what mason work dc the law require?

5. If piles should be driven without reaching solid botto how would you know whether they were able to support t wall above?

6. Why is it important to see that a footing is no narrow and no wider than the plans call for?

7. Is it dangerous to make a footing too wide? If so, wh

8. If a concrete footing were made too wide for safe how might it easily be made safe?

9. Suppose an excavation were to be dug below the fo ings of an adjoining building. State fully what is required such cases in the way of protection and new work.

10. What peculiarity is required for mortar of foundati walls, which is not needed above ground?

11. Name three ways of securing face-brick to the backi

12. Describe the arrangement of floor beams about a chi ney-breast: (*a*) Location of header; (*b*) location of trimm (*c*) how are the beams to be framed together? (*d*) what s should the header and trimmer be?

13. Suppose a white pine post of moderate height to used temporarily for the support of a load, what load wo you consider it safe to apply per square inch of its cro section?

## ARITHMETIC.

*1. Add 18′ 8″; 24′ 11″; 13′ 7″; 25′ 8″; 17′ 5″; 34′ 6″; 11″.*

2. Subtract 189′ 9″ from 304′ 3″. 3. Multiply 12′ 9″ by 319′.

4. If a floor 125′ 5″ long is covered with tiles each 9″ long, how many tiles are there in a line?

5. Find the cubical contents of a wall 310′ 7″ long, 10 ft. high, and 12′ 8″ broad.

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## Inspector of Buildings—Iron and Steel Construction.

### Technical.

1. (*a*) Describe the differences in the appearance of fractures of good steel and of good cast-iron. (*b*) Also how both differ from that of good wrought iron.

2. Describe the appearance of each of the above when the material is poor.

3. State what a drift-pin is for, and whether it has any effect upon the strength of the material in which it is used, and what that effect is.

4. (*a*) Describe carefully the whole operation of driving a rivet properly, beginning with the heating. (*b*) Describe every way in which improper work is done in driving a rivet. (*c*) State how you would test a lot of riveted work.

5. (*a*) Describe the proper way of testing thoroughly the thickness of a cast-iron column. (*b*) Describe carefully the method of testing the soundness of a cast-iron column. (*c*) What parts of a cast column require especial care in examination to prevent accident?

6. (*a*) Suppose a cast-iron column to be ½ inch too short, what would you do? (*b*) Suppose such a column to have one of the ends not turned square to the axis, what would you do?

7. (*a*) Make pencil or pen sketches of a wrought-iron column in the front of a building showing front and side views, giving clearly the details for the support of the wall, say 12

the second story. (*b*) Show clearly also the method of splicing such a column.

8. Where in a detail drawing a number of small circles are shown at some parts all filled in with hatching, or entirely black, what does it mean?

9. In setting the iron base of a large column on a masonry foundation, what is the very best way of doing it to secure a thorough bearing?

10. As you know, in building very high buildings, it is customary to run the ironwork up, and store large quantities of materials upon the floors during the construction. Are floors ever overloaded in this way, and if so, what would cause you to think so?

11. Would you consider it necessary to make any inspection of girders, posts, or other ironwork, after delivery on the grounds, before erection? If so, state exactly and fully what that inspection should be.

12. Suppose that during erection certain rivet holes do not come "fair"; (*a*) What might it indicate in the case of a floor beam? (*b*) How should such errors of every kind be corrected?

13. Is there any difference in the strength of riveting done in the shops and on the work? If so, which is the stronger, and why?

14. (*a*) Where bolts are to be used permanently in a work, how is the strongest job obtained? (*b*) Which is the stronger, bolting or riveting, and why?

15. Are any precautions against wind ever necessary in the erection of ironwork in a building, and if so, what?

## MATHEMATICS.

1-2. A bar of iron 3 ft. long and one inch square weighs *about 10 pounds*, and steel weighs 2% more. Assuming *this, calculate the* weight of a plate girder 25 feet long, and

30 inches deep, which is made up of a web-plate ¼ inch thick, two cover-plates each 8 inches wide and ⅜″ thick, four angles each weighing 8 pounds per foot, and, say (including ends and intermediates) 12 vertical stiffeners, weighing, say 5 lbs. per ft.

3. A brick wall resting on a girder measures 18 ft. long, 13 ft. 6 in. high, and is 15 inches thick. In it there is a window 9 ft. 6 in. high, and 6 ft. 3 in. wide. Assuming brickwork to weigh 115 pounds per cubic foot, what load does the girder sustain?

4. The iron beams in a warehouse floor span 16 ft. and each weighs 40 lbs. per foot. The spans between the beams are 5 ft. 6 in. The arches weigh 40 lbs. per square foot, and a load of 270 lbs. per square foot in addition is to be provided for. What is the total load on one floor beam?

5. Add together 3′ 7½″, 9′ 2¼″, 12′ 9⅛″, 27′ 42″, 14′ 11⅜″.

## Oral.

Note: This part of the examination consists mainly of oral questions regarding several numbered specimens that are placed before the applicant.

1. (*a*) Of what material does No. 1 consist? Is it good or bad? (*b*) State the same of No. 2.

2. What is the material in 3 and 4? Also, from the fracture, which would you think the stronger?

3. What is the material in No. 12? Is it good or bad?

4. Would you say No. 17 is good for a rivet or not?

5. Understanding that the riveted specimen before you is part of a column, is the joint in the web properly made? Why do you say this?

6. Are holes 1 to 5 and 6 to 10 equally good? Why?

7. *Look at the rivets*, and see whether any should be condemned, and why.

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8. What forms of iron bars, etc., would you say these columns are made of?

9. Tell me from the table what column No. 60 on the eighth floor consists of?

10. Describe the details of column No. 36 on these plans. What the arrangement is for, where each section is taken.

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## Inspector of Plumbing, Light, and Ventilation.

### TECHNICAL.

1. (*a*) Give the rules governing the open space required on every lot occupied by a tenement-house or a lodging-house. (*b*) Define what constitutes a tenement-house and also a lodging-house.

2. Give the rules governing the light and ventilation of every sleeping-room in such houses.

3. (*a*) Is there any difference between the expression "three feet square" and "three square feet," and if so, what is it? (*b*) What do you mean by percentage in the expression 65 per cent. of a lot surface?

4. (*a*) What is the least area allowed in all shafts and courts? (*b*) Under what conditions may such shafts be covered? (*c*) How must all halls be ventilated?

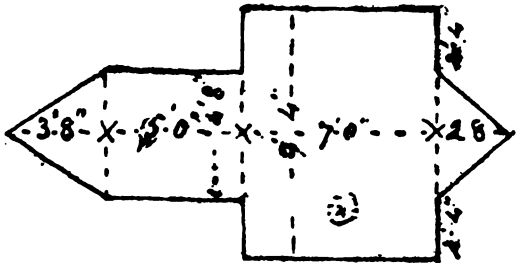
5. What are the least cubical contents allowed in sleeping-rooms?

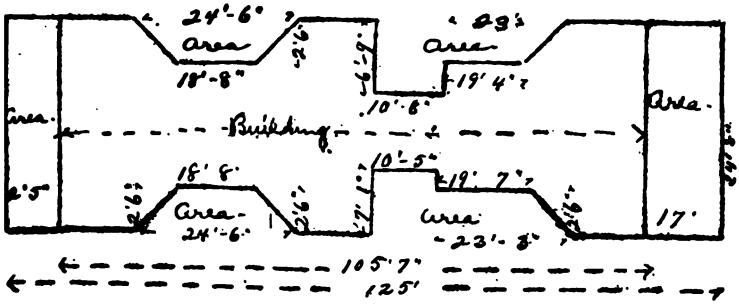
6. Name, without describing them, all the pipes in a system of plumbing in a tenement-house, giving them in order from the top of the building to the connection with the sewer.

7. *State all the* ways in which such a system, when thoroughly good as put in, may afterward be damaged, either during construction of the building or at a later period.

8. Describe a thoroughly good "house-drain," including in your description everything which must be done to prevent leakage and stoppage, and to make it durable and efficient in every way.

9. The following diagrams show several forms of light and ventilation areas, with their dimensions. Calculate the area of each.




10. (*a*) Describe the "vent-pipe" in a tenement. (*b*) State where the branches should be attached at each closet and the other requirements for making the branches effective. (*c*) *State where the* vent should be attached to the soil-pipe *at the upper end* (*if it* is so attached), where at the lower end,

the method of such attachment, and all the requirements of a good job.

11. Describe the fresh-air pipe, including the proper terminations to make it most effective.

12. State, as far as you can, all the methods pursued by dishonest workmen or employers in "scamping" work.

13. Describe the best method of testing a system of plumbing; give full details.

14. What constitutes a good and sufficient flushing system to a water-closet?

15. (*a*) Describe a "soil-pipe" in a large tenement. (*b*) How it should be supported. (*c*) How it should be terminated at the top. (*d*) How it should be attached to the house-drain.

## ARITHMETIC.

1. Multiply 8′ 5″ by 17.

2. Divide 165′ 7″ by 6.

3. What is the area of a lot having parallel sides 102′ 6″ and 98′ 4″, the width being 18′ 4″?

4. A room is 12′ 8″ × 15′ 6″ by 9′ 9″ in height. How many persons should be allowed to occupy the room, allowing 600 cubic feet of air for each person?

## Patrolman—Police.

### Spelling.

Immediately, authority, severe, necessary, complainant, attendance, hospital, important, accompany, violation, daily, ordinance, believing, character, malignant, illegal, material, kerosene, especially, acquainted, business, discretion.

### Rules and Regulations.

1. What is the meaning of the following words and phrases as used in the regulations of the Police Department: (*a*) misdemeanor; (*b*) sufficient to warrant a presumption; (*c*) homicide; (*d*) proper authority; (*e*) positive proof.

2. What bad results would be likely to result from allowing patrolmen to be delegates to a political convention?

3. What are the different penalties which may be imposed upon patrolmen by the Commissioner, and for what offenses?

4. You find the balcony of a fire-escape encumbered. Make a memorandum such as is required by the regulations, and state what is your further duty in the matter.

5. What is the duty of a patrolman with reference to persons who have been the victims of murderous assault, and why is this duty imposed?

### Memory Test.

Look for Lena Schultz, said to be brought here from Pennsylvania for immoral purposes. She is 18 years old, 5 feet 2 inches tall; wore a pink striped shirt waist, dark skirt, straw hat, and white veil.

### City Information.

Brooklyn.

1. Name the stations of the Kings County Elevated R. R. between the Brooklyn Bridge and Tompkins Avenue.

2. Through what streets would you walk in going (*a*) from the Brooklyn office of the Board of Education to that of the Deputy Commissioner of Bridges; (*b*) from the Academy of Music to the Oxford Club; (*c*) from the Athenæum to the Brooklyn Hospital?

3. At what point do the following lines leave Fulton street: (*a*) Flushing avenue line; (*b*) Third avenue line; (*c*) Gates avenue line; (*d*) Halsey street line?

4. In what direction from the Brooklyn Borough Hall is (*a*) Bensonhurst; (*b*) U. S. Marine Hospital; (*c*) Atlantic Basin; (*d*) Bergen Beach; (*e*) Hotel St. Margaret?

5. In what part of the borough are there (*a*) numbered places (as Second Place, etc.); (*b*) lettered avenues (as Avenue C, etc.); (*c*) north and south numbered streets (as South 8th street)?

### Arithmetic.

1. Add: 769846; 438695; 879486; 597835; 762945.
2. Subtract 280987 from 430264.
3. Multiply 76094 by 4037.
4. Divide 2392368 by 4728.

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## Promotion to Roundsman—Police.

### Laws and Ordinances.

1. (*a*) Name three crimes for which bail may be accepted at the station house; state briefly what constitutes the offense in each, and name the amount of bail you would fix in each case.

(*b*) Name three crimes for which bail may not be so accepted, and state briefly what constitutes the offense in each.

2. Indicate briefly but precisely all the facts necessary to constitute the distinct and differing violations (*a*) of the excise law; (*b*) of the gambling laws.

3. Indicate briefly (*a*) all the limitations upon the powers of an officer in regard to the execution and return of a warrant for arrest for a misdemeanor; (*b*) the facts which distinguish and define the various kinds and degrees of assault; (*c*) the facts constituting riot.

4. Enumerate five businesses requiring a license from the Bureau of Licenses, and state briefly three or more of the provisions regulating some one of them.

5. What are the principal provisions of the city ordinances (*a*) as to projecting signs; (*b*) the display of goods on the sidewalk?

LAWS AND ORDINANCES. (EXTRA PAPER.)

1. State in detail what evidence it is necessary to have to convict a person (*a*) of keeping a disorderly house; (*b*) of being a common gambler; (*c*) of keeping apparatus for gambling.

2. State as particularly as you can all the various activities that a citizen may engage in on Sunday without violating the Sabbath law.

3. (*a*) Name three crimes which are punishable by imprisonment for life, and state fully what facts constitute the offence in each.

(*b*) Give a list of offences which are generally punished by fine only, stating briefly the essential facts constituting each.

4. (*a*) State fully all possible circumstances in which an arrest may be made without a warrant. (*b*) In what various ways may a person commit larceny, and how are the different degrees distinguished? (*c*) What constitutes a hotel?

5. (*a*) *Indicate* briefly the provisions of the city ordi-

nances regulating the following subjects: (*a*) railroads; (*b*) second-hand dealers and junk shops; (*c*) driving horses.

### Rules and Regulations.

1. (*a*) If a patrolman leave his post, what report, if any, does he make and to whom? (*b*) What inspection of dormitories is a roundsman called upon to make, and what is the nature of his report of such inspection? (*c*) In what places is smoking prohibited under the rules?

2. (*a*) How often, under whose direction and in what subjects must roundsmen instruct the patrolmen in their respective sections? (*b*) What is the form of salute under the rules?

3. (*a*) How does a roundsman prefer charges against a patrolman? (*b*) Outline the steps that are taken before the patrolman is tried by the police commissioner. (*c*) What is the rule with reference to erasures in the blotters and other documents of the department?

4. (*a*) What is the length of the full step in quick time? (*b*) In double time? (*c*) Short step in quick time? (*d*) Short step in double time? (*e*) Side step? (*f*) Back step? (*g*) How many kinds of commands are there, and give an illustration of their use.

5. (*a*) Is a roundsman ever permitted to take bail, and under what circumstances? (*b*) What is the rule of the department with reference to the taking of bail?

### Report.

Suppose that on your round at night you observe several infractions of the law. Write such a report as would be necessary, properly addressed, assuming such facts as you please.

### Report. (Extra Paper.)

*Suppose that* you are a roundsman, and in making your *tour you observe* three violations of corporation ordinances

Assuming such facts as you please, make a report to your superior officer of what you observed and your action.

## LOCALITIES.

Take I. or II., but *not* both.

### I. Manhattan and the Bronx.

1. Give the location of the police station house and the ity Magistrate's Court nearest to each of the following: (*a*) iffany's jewelry store; (*b*) Mills Hotel, No. 2; (*c*) Grand pera House; (*d*) St. Joseph's Hospital; (*e*) Manhattan Colge.

2. Give the boundaries of the "Tenderloin" precinct, solled. Why so named? What conditions give to this secn of the city its special importance to the Police Departnt? Where is the police station for this precinct? Name d locate the five largest hotels in this precinct.

3. In case of a serious strike on all lines of the Manhattan evated R.R. Co., at what points, in your opinion, would the operty of the company be in greatest danger and need of lice protection? On what elevated lines has electricity ently been substituted wholly or in part for steam power?

4. Name and locate five hospitals from which ambulances re summoned to the scene of the explosion in the Rapid ansit Tunnel, January, 1902, and give shortest route for ambulance from each of the hospitals to scene of explon.

5. What prominent buildings are situated as follows:

(*a*) N.E. corner Sixth avenue and Eighteenth street;

(*b*) 150 Nassau street;

(*c*) West street, between Fulton and Vesey streets;

(*d*) West side of Amsterdam avenue, between 135th *138th streets;*

(*e*) Upper part of Bronx Park, near Bedford Park station.

II. Brooklyn and Queens.

1. Give the location of the Magistrates' Courts at which you would take prisoners arrested at (*a*) The Criterion Theatre; (*b*) St. Peter's Hospital; (*c*) L. I. City Ferry House; (*d*) Oriental Hotel.

2. From what five precincts could reserves be most expeditiously sent to quell a riot among the Italians in lower Union street, and what would be the best route for each detachment to take?

3. Locate the power-houses of the following trolley lines: (*a*) Smith street; (*b*) Lorimer street; (*c*) Bergen street; (*d*) Cypress Hills; (*e*) Crosstown.

4. What ward in Brooklyn has (*a*) the largest population; (*b*) the smallest area; (*c*) the largest assessed valuation; (*d*) the greatest extent of water-front?

5. What ferry to Manhattan is nearest the intersection of the following streets: (*a*) Congress street and Henry street; (*b*) Cumberland street and Lafayette avenue; (*c*) Bedford avenue and Madison street; (*d*) Broadway and Wythe avenue; (*e*) Lee avenue and Wilson street?

LOCALITIES (EXTRA PAPER.)

Take I. or II., but *not* both.

I. Manhattan and the Bronx.

1. You are sent on errands from Police Headquarters to the following places, in the order named: (*a*) Office of Department of Docks and Ferries; (*b*) 8th Precinct Station *House; (c) 125th* street station house; (*d*) Office of President *of Borough of* Bronx; (*e*) Headquarters of Fire Department, *and returning* to starting-point, using surface or elevated

railroad cars. Name the different lines used and the points at which you would make changes.

2. Give the names of five city parks in Manhattan below Twenty-third street, also five in the Bronx, and give boundaries of the five named in Manhattan.

3. In taking prisoners from Jefferson Market Police Court to the New York Catholic Protectory, what would be the most direct route for a police patrol wagon? Give all streets and avenues that would be passed through.

4. What ferry to Brooklyn is nearest Equitable Building?
" " " " " " Grand Central Depot?
" " " Jersey City " Fifth Avenue Hotel?
" " " L. I. City " U. S. Sub-Treasury?
" " " Hoboken " " The City Hall?

5. What prominent building is at junction of Fifth avenue and Broadway? Name two theatres and two hotels overlooking Long Acre Square. What large building is being erected on the east side of Bryant Park?

## II. Brooklyn and Queens.

1. (*a*) If a fire started in the Montauk Theatre, from what five precincts would reserves be drawn? (*b*) Give the routes these reserves would take in marching from their respective precincts to the Montauk Theatre.

2. (*a*) Give the streets and avenues through which the Crosstown line runs in going from the Erie Basin to Hunter's Point; (*b*) the Smith street line in going from the Brooklyn Bridge to Coney Island; (*c*) the Marcy avenue line in going from Hamilton Ferry to Broadway Ferry; (*d*) Give the route of the line of cars that runs from Thirty-fourth Street Ferry, Long Island City, to Calvary and Lutheran Cemeteries.

3. (*a*) Name the sections of Brooklyn, specifying the

streets and avenues, where the Italian population is to be found; (*b*) the colored population; (*c*) the Hebrew population; (*d*) What precincts are near the East River between Erie Basin and Broadway Ferries?

4. Locate the Magistrates' Courts in Brooklyn, and state to which court each of the Brooklyn precincts sends its prisoners.

5. (*a*) Using the points of the compass, in what direction does Broadway run? (*b*) Fulton street; (*c*) Flatbush avenue; (*d*) Bushwick avenue; (*e*) Manhattan avenue; (*f*) Lafayette avenue; (*g*) DeKalb avenue; (*h*) Jamaica avenue; (*i*) Jackson avenue.

CITY GOVERNMENT.

1. What heads of bureaus or departments are appointed by the Mayor, and what by the Borough Presidents?

2. What official under the present charter takes the place of the former Chief of Police?

3. (*a*) By whom and under what conditions may the Police Commissioner be removed? (*b*) What power of appointment has the Commissioner?

4. What change has taken place within the last six years with reference to the Park Police?

5. For what offenses may a roundsman be reduced to the ranks?

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## Roundsman—Docks and Ferries.

DUTIES.

1. On making your rounds if you failed to find a watchman on his post, what would you do? Answer this fully.

2. *What part of* the water-front of Manhattan needs the *most vigilant attention* on the part of watchman and roundsman? *Give the* reasons for your answer.

3. If you suspected a watchman was in league with river thieves, what steps would you take to detect him?

4. If while on duty a message should summon you home on account of the severe illness of a member of your family, what would you do?

5. To what extent, if any, do you think the water-front of Staten Island should be protected by watchmen and roundsmen?

6. On what part of the water-front of Brooklyn are thefts most likely to occur? Why do you think so?

7. Under what circumstances would a roundsman be justified in shooting any one?

8. Give approximately the number of miles of water-front to be guarded by watchmen in New York City.

9. If while on a tour of duty you saw a burning vessel coming down the river which might set fire to some one of several piers, state precisely what you would do.

10. In such a case as is given in question 9, write a report to the head of the department, assuming what facts you choose.

## ARITHMETIC.

1. Add 1789657842; 7892367854; 1796857463; 1789658728; 1796857289; 978652; 98764787; 98566; 987657899; 1897867544; 8987654326; 2773884995; 2837495828 7894678266.

2. Multiply 760.985 by 37.04.

3. Divide 288179166 by 47289.

4. What number added to 7/9 of $18\frac{3}{4}$ will equal 9/10 of $41\frac{2}{3}$?

5. A retail merchant who had failed, found that his assets were $6,720. He owed $925 to B, who received $592. For what amount did he fail?

EXPERIENCE.

Applicant is asked to give particulars of education, and to state what particular knowledge he may have of the water-front.

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## Promotion to Sergeant of Police.

LAWS AND ORDINANCES.

1. (*a*) What is an habitual criminal? (*b*) What authority have the courts over such individuals? (*c*) What are the duties and powers of the police in regard to this class?

2. You being a sergeant at the desk, a man is brought in who was seen to lay a package on one of the rails of the Third avenue surface road. The package, which was picked up before any car came along, contains a brown powder. (*a*) State fully what disposition you would make of the case. (*b*) If you held the man, would you accept bail or not? Give your reasons.

3. What is a disorderly house?

4. A patrolman meets with violent resistance while endeavoring to arrest two men who are fighting in a crowd. State fully how he may secure assistance, if needed.

5. What should a patrolman do, who meets in the street a man hauling sawdust loose in a cart or wagon?

6. You being at the desk, a man is brought in who was seen to offer money to a juryman. (*a*) On what charge would you hold him? (*b*) Mention any other form or instance of the same crime.

LOCALITIES.

(Take I. or II. Not both nor parts of both.)

*I.* Manhattan and the Bronx.

*1. In what police* precincts are the following: Van Cortlandt *Park, Mt.* Morris Park, The American Museum of

Natural History, Wanamaker's Store, and the U. S. Custom House? Give the location of the police station nearest each of the above.

2. A police officer is sent from Police Headquarters to the pier of the Cunard Line and thence to the Astoria Ferry; by what street-cars—surface or elevated—can he go most quickly and return without delay to headquarters? About what distance would he travel?

3. If a serious fire should occur at the Presbyterian Hospital and a large force of police should be needed there, from what precinct stations would they be ordered? Answer the same question, supposing the fire to occur at the Montefiore Home.

4. A policeman stationed at Washington Bridge is asked by a bicyclist the most direct route to Fort Schuyler; what direction should the officer give?

## II. Brooklyn and Queens.

1. What cars would you take from the New York end of the Bridge to reach the following places, and if transfers were necessary, to what cars: (*a*) Broadway Ferry, E. D.; (*b*) Fort Hamilton; (*c*) Greenwood Cemetery?

2. Name and locate in Borough of Brooklyn: (*a*) five hotels; (*b*) five theatres.

3. Assuming that you were detailed at 22d Precinct station house and a riot was reported in progress at Bath Beach, through what streets would you drive patrol wagon with squad to reach there quickest?

4. Where are the following buildings located: (*a*) County Court House; (*b*) Municipal Building; (*c*) Public School No. 10; (*d*) Public School No. 9; (*e*) Brooklyn Post-office?

5. *How many* precincts are there in Borough of Queens, *and where is each* station house located?

## Rules and Regulations.

1. Name five of the most important reports made by an officer in command of a precinct, and state to what official each report is directed.

2. What is the substance of the rules relative to parades?

3. What are the main duties of a sergeant, and what are those of a roundsman?

4. Relative to conduct and deportment, state: (*a*) What is the rule as to the use of tobacco? (*b*) What is the rule as to salutes? (*c*) What are the political rights and what the political disabilities of a policeman? (*d*) What is the rule as to civility and politeness?

5. What do the rules prescribe relative to lost or arrested children?

6. Write a report giving in detail an account of one act showing conspicuous personal courage of an officer in the discharge of his duty, assuming any facts you please.

## Dictation.

This consideration has been repeatedly urged by those opposed to any extension of municipal functions, and is considered one of the most important arguments against the movement. The only alternative, then, is the application of the merit system and the consequent absolute elimination of party politics from the administration of non-political public offices. Any great increase in the number of public employees without the thorough and honest application of the principles of civil service reform will bring naught but danger and disaster to the people.

## Promotion to Captain—Police.

LAWS AND ORDINANCES.

1. Regarding Courts: (*a*) What courts have criminal jurisdiction in the City of New York? (*b*) What class or mind of crimes or offenses are usually tried or disposed of in each of the courts you have mentioned?

2. (*a*) What is deemed a "public hack"? (*b*) What special regulations apply to public hacks and hackmen in the City of New York?

3. As to pistols: (*a*) What persons are allowed to carry them without a permit? (*b*) When required, how is a permit obtained? (*c*) What is the penalty for carrying them unlawfully and how enforced?

4. (*a*) What is a "riot"? (*b*) As Captain of Police, what measures would you take to prevent and suppress rioting? (*c*) What is the penalty on conviction for this crime?

5. State briefly the instructions you would give to officers under your command regarding the suppression of disorderly houses and prostitution.

LAWS AND ORDINANCES. (EXTRA PAPER.)

1. Regarding Licenses: (*a*) What is their object or purpose? (*b*) By whom and how are they issued? (*c*) What persons or classes of persons require licenses for their business in the City of New York?

2. (*a*) What is deemed a "public cart"? (*b*) What special regulations apply to public carts and cartmen in the City of New York?

3. As to Gambling: (*a*) What is gambling, and when is a person deemed a "common gambler"? (*b*) As a captain of police what lawful measures would you take to suppress gambling in your precinct? (*c*) What authority would you *have over gambling* implements found?

4. (*a*) What constitutes the offense of disturbing a religious meeting? (*b*) As a captain of police what lawful measures would you take to cause proper observance of the Sabbath in the City of New York? (*c*) What is the penalty for conviction of the crime of "Sabbath Breaking"?

5. State briefly the instructions you would give to officers under your command regarding the enforcement of the Excise Law.

RULES AND REGULATIONS.

1. (*a*) What must a captain report on Monday of each week to the inspector of the district in which his precinct is located? (*b*) What is the full duty of every member of the force who discovers a break or leakage in a water-main or water pipe? (*c*) What is a captain's duty with reference to a person found unconscious in his precinct and subsequently removed to a hospital?

2. (*a*) What is the rule with reference to members of the force rendering assistance in civil cases? (*b*) When may a member of the force execute a warrant of arrest or search? (*c*) What daily report must a member of the force assigned to a court make to his commanding officer?

3. (*a*) What is the length of the full step in quick time and in double time? (*b*) What is the length of the short step in quick time and the short step in double time? (*c*) What is the length of the side step? (*d*) What is the length of the back step? (*e*) Define the preparatory command and the command of execution as recognized in the School of Instruction?

4. (*a*) Name five diseases belonging to the contagious class; (*b*) What is the duty of members of the force with *reference* to giving notification of diseases they may find in *their precincts?* (*c*) What is a captain's duty with reference *to the service* of subpoenas on members of the force and *others?*

5. (*a*) Under what circumstances would you, as captain, permit a patrolman to receive a sum of money from a citizen for meritorious service in the discharge of his duty as a patrolman? (b) What is the rule with reference to applications for leaves of absence, and what facts must such applications contain?

6. (*a*) What certificate must a commanding officer furnish to a member of the force who has been transferred to another precinct? (*b*) What facts should such a certificate contain? (*c*) With reference to this certificate, what is the duty of the commanding officer of the precinct to which such member of the force has been transferred?

### Report.

Suppose a general strike of street railway employees, accompanied by rioting and calling for the intervention of the police. Assuming any facts you please, write a report of the affair and of your action as captain of police.

### Report. (Extra Paper.)

Suppose a riot occurs between whites and Chinese in the precinct of which you are captain. Assuming any facts you please, write a full report of the occurrence and your action.

### City Government.

1. (*a*) What is the official title of the head of the Department which has charge and control of the following matters: Streets signs; the sale of illuminating oil; management of the recreation piers; the free swimming baths; vagrants? (*b*) What body or bodies constitute the legislative branch of the city government under the present charter?

2. *What is* meant by a bi-partisan Commission? Give *the names of the* members of the last bi-partisan Police Com-

mission of this city, the party to which each belonged and by whom they were appointed.

3. State, precisely and fully, the powers and duties of an Inspector of the Police Force. How many inspectors are there?

4. What are the relations and mutual obligations of the Police and Street Cleaning Departments?

5. For what offenses and breaches of discipline may a member of the police force be subject to trial in a criminal court?

LOCALITIES.

1. If a messenger should be sent from Kingsbridge to Far Rockaway, with instructions to stop on his way at Police Headquarters of the Boroughs of Manhattan and Brooklyn, what route would he take and what public conveyances would he make use of in order to finish his journey as quickly as possible? About how many miles would he travel, one way only?

2. Where are the following named islands situated? (*a*) Ellis; (*b*) Hart's; (*c*) Randall's; (*d*) Barren; (*e*) Hoffman's? To what borough does each belong? Name a public institution situated on each one of them.

3. Name five ferry lines, the boats of which cross the East River, giving the location of both slips for each ferry. Give location also of one police station house, on either side of the river, for each ferry from which aid would be summoned in case of a serious fire or accident on a boat of that line.

4. Give the location of the following: New York Herald Building; The Grant Monument; Van Cortlandt Park; St. Patrick's Cathedral; Plymouth Church; U. S. Navy Yard; Calvary Cemetery; Fort Hamilton; Havemeyer's Sugar Refinery; Wanamaker's Department Store.

5. Name the five boroughs of New York City in the order of their population; also in the order of their territorial ex-

tent. Name adjoining cities and towns lying immediately north of the Bronx and east of Queens boroughs.

CITY INFORMATION—SPECIAL. (EXTRA PAPER.)

I. Manhattan and the Bronx.

1. (*a*) Give in a general way the boundaries of the following police precincts, locate the station house in each, state the approximate strength of the force in each, and name the officer at present in command: 1st; 5th; 8th; 15th; 20th; 22d; 25th; 31st; 39th; 41st. (*b*) State in which, if any, of the above-named precincts you think the present force should be either augmented or increased, and give your reasons.

2. (*a*) If an alarm should be telegraphed from Philadelphia to the New York Police Department to look out for a dangerous criminal, state specifically what points in your opinion would require the most immediate attention. (*b*) State the same thing with regard to a similar alarm from Boston. (*c*) From Chicago.

3. By what route could a messenger travel most quickly from the 3d Precinct station house to the following points, using the ordinary means of public conveyance, such as street cars, railways, etc.: (*a*) From said station house to Bowery Savings Bank; (*b*) thence to Hudson Street Hospital; (*c*) thence to Brokaw Brothers; (*d*) thence to United Charities Building; (*e*) thence to Endicott Hotel; (*f*) thence to the nearest Recreation Pier; (*g*) thence to St. John's P. E. Cathedral; (*h*) thence to St. Joseph's Home; (*i*) thence to Williamsbridge; thence returning to the station house?

4. Locate the following courts: (*a*) City Court; 2d, 6th and 9th Municipal (Manhattan); 2d Municipal (Bronx); 3d and 6th Police Magistrates'; (*b*) The following public offices: U. S. Naval Office; U. S. Steamboat Inspection Service; *Deputy Commissioner of Excise; Sheriff; Health Department; Coroners* (Manhattan and Bronx).

II. Brooklyn and Queens.

1. On an average how many patrolmen are there to the square mile in (*a*) Brooklyn; (*b*) Queens?

2. From what five Brooklyn precincts could reserves be most expeditiously sent to the City Hall, Manhattan, at a time when all traffic on the Brooklyn Bridge was suspended? What would be the best and quickest way for each of these detachments to reach its destination?

3. Locate exactly (*a*) The County Clerk's Office, Queens; (*b*) The Surrogate's Office, Kings; (*c*) The Sheriff's Office, Queens; (*d*) Bureau of Vital Statistics, Kings; (*e*) The largest cemetery in Queens; (*f*) The largest building in Kings.

4. Give the number and boundaries of the precinct containing (*a*) the largest foreign population in Brooklyn; (*b*) the largest American population in Brooklyn; (*c*) the largest average in Queens.

5. Which street corner in Brooklyn is passed by the largest number of railroad lines, steam and trolley, and which by the next largest number? Name the lines in each instance.

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**Doorman—Police.**

DUTIES.

1. What do you consider to be the duties of the position?

2. What discretion do you think Doormen should have in admitting persons to public offices?

3. Are there any classes of persons Doormen should always exclude? If so, name the classes.

4. Where is the office of the Mayor; the Controller; the Corporation Counsel; the Police Commissioners; the Fire Commissioner?

5. You have an altercation with a man who attempts to enter an office from which you have been directed to exclude

him. Assuming such facts as you choose, write a report of the incident to the head of the office.

ARITHMETIC.

1. Add 470086; 9832; 64758; 27; 942563.
2. Subtract 96058 from 207839.
3. Multiply 40862 by 9753.
4. Divide 3361274 by 8279.
5. At 17 cents a yard, how much would 34 yards cost?

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## Keeper.

DUTIES.

1. What, in general, do you understand to be the duties of a keeper, and what qualifications, apart from character and the requisite ability, the most essential?

2. To what extent should a keeper make a study of the character of the prisoners under his charge?

3. You are in charge of a gang of prisoners out of doors, when you observe a fire in one of the prison buildings. What would you do?

4. When, if ever, may a keeper use force? Give reasons for your answer.

5. On what principle are prisoners grouped in cells when the prison is crowded?

6. You suspect a man of attempting to incite his fellow prisoners to an uprising, but you have no proof. Write a *report to the* proper officer of your action in the case, *assuming any facts* you please.

ARITHMETIC.

1. Add 437868; 248564; 927842; 436593; 384767.
2. Subtract 284099 from 432087.
3. Multiply 67482 by 4039.
4. Divide 146543 by 4789.

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## Watchman.

DUTIES.

1. Apart from good character, what qualifications, jud ing from your own experience, are most essential in a go watchman?

2. Suppose you are alone in charge of a building at nigh You see two men in the street assaulting a third. Wh would you do if no one else was in sight?

3. Suppose some such case as is mentioned in question Assuming any facts you please, write a report of the occu rence and of your action.

4. What rules would you consider proper to lay down to the use of firearms and other weapons by watchmen?

5. Suppose a water-main should burst, flooding the cell of the building of which you are in charge. What wou you do?

NOTE: For Arithmetic, see "Keeper."

## Fireman.

### Rules and Regulations.

1. Give the reason, as you understand it, for the rule gov-ıing a newly appointed fireman requiring him to report the time named in his order, and state also the rule.
2. So far as appears in the rules as you have read them, ıat are the duties of a Fire Marshal? What are the duties a private towards a Fire Marshal?
3. Firemen are forbidden (except in cases of actual neces-y) to mount or dismount from the steps of the apparatus front of the wheels while they are in motion. Mention e or more cases of what you consider "actual necessity" der the rule.
4. What is the intention of the department with reference the contents of the company journal?
5. Give the meaning of the following words or phrases as ɜd in the rules: (*a*) Trustworthy fireman; (*b*) Evidence; (*c*) ovision for sitting-room; (*d*) True facts and conditions; Exemption.

### Rules and Regulations. (Extra Paper.)

1. Suppose a fireman, to avoid annoyance, should give a ɜditor a wrong address. State what rule or rules (quoting ɜm) he would violate, and to what punishment he would liable.
2. What is the meaning of the word "partisan" in the .e forbidding a fireman to be a member of a partisan con-ıtion, and why should such a rule be necessary? Answer th questions.
3. Give an instance of what you would consider an act of *vardice on the* part of a fireman.
. *Who may* be excluded from company headquarters, or

partially excluded (include the hours, if any are specifie when the rule varies) and give your opinion for the exclu sion.

5. You are sent to serve a notice from the Bureau of Com bustibles on the proprietor of a grocery shop where keroser oil is sold. You find a boy of 12 years in charge. Make return of your action, in proper form, addressed to th right person, and containing all necessary particulars.

### City Information.

#### Manhattan and the Bronx.

1. What is the general route of the new undergrou railroad (Rapid Transit), and where are the terminal statio to be located? What streets or avenues are most obstruct at this time by excavations for this work?

2. Give the exact location of each of the following: Ast Library; St. John's College; Hebrew Orphan Asylum; Gra Church; 8th Regiment Armory; Aquarium; Washingt Bridge; Empire Building; Office Board of Education; Pi of White Star Line.

3. By what lines of cars, surface or elevated, could you by the quickest route from East Thirty-fourth Street Fer to Kingsbridge? At what points would you change cars?

4. What prominent buildings are situated as follows: ( Fifth avenue and Forty-fourth street (N.E. corner); ( Madison avenue and Twenty-third street; (*c*) Fulton a Pearl streets (S.E. corner); (*d*) Broadway and Thirty-fif street (N.E. corner); (*e*) No. 46 Bowery?

5. Name and locate five well-known theatres in eith borough, no one of which is situated on Broadway.

#### Brooklyn.

1. *If serious fires* should break out at nine o'clock in t *evening at the* Brooklyn Post-office and at the foot of W

tague street, which in your opinion would be the more important, and why?

2. Engine No. 103 is sent from its house (Hicks street near Degraw) to a fire at the U. S. Navy Hospital. What would be its most direct route, and what streets on which elevated trains run would it cross?

3. If alarms of fire were sent in from the following points, what important buildings would be indicated as in danger: (*a*) Bedford avenue and South Ninth street; (*b*) Fulton street and Bridge street; (*c*) Atlantic avenue and Clinton street?

4. Name the streets which cross (or terminate at) Court street, between Union street and Fulton street. Name the trolley roads crossing Court street between those points.

5. Specify the block within half a mile of Loeser's where it would be the hardest to fight a fire on account of the narrowness of the street and other difficulties.

### Arithmetic.

1. Add 789657, 437869, 376787, 895496, 967849.
2. Subtract 280976 from 430215.
3. Multiply 40897 by 6098.
4. Divide 2874737 by 4728.

### Spelling. (Extra Paper.)

Companies; suspicious; reliable; unnecessary; disturbance; subordinate; prejudicial; ascertain; beverages; solicit; dereliction; apparatus; scrupulously; visible; business; intelligently; journal; written; heavy; corporation.

### Memory Test. (Extra Paper.)

1. Several small fires of suspicious origin have lately occurred *in the tene*ment-house district east of the Bowery. *The greatest pains* should be taken to detect the starters of

these fires, as a conflagration in that district would be extremely disastrous.

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## Fireman—Engineer of Steamer.

### Rules and Regulations.

1. What, in general, are the duties and responsibilities of an engineer of steamer?

2. Is there any danger to engines in cold weather? If so, state the troubles that may arise, and how they are overcome or prevented.

3. Explain fully "suction" and "hydrant" connection, and state when each is used and the precautions to be observed.

4. What are the rules equally binding on all uniformed members of the department?

5. State the duties of an engineer at the engine-house after a fire and also his ordinary duties.

### Localities.

Boroughs of Manhattan and the Bronx.

1. Suppose the Grand Central Station were burning and a high northwest wind were blowing. What large building in the vicinity would be threatened, and is the building threatened of such a nature as to require particular precautions? If so, what precautions should be taken?

2. Name five engine companies that would be most likely called to respond to an alarm of fire from the Cosmopolitan Hotel.

*3. Name* and locate five engine companies in the Borough *of the Bronx.*

*4. An engine* company on Sixty-seventh street, near Third

avenue, is called to subdue a fire at the Museum of Natural History. What would be the quickest route to go?

5. Name four hotels on Fourth avenue and mention the safeguards of each hotel named as against fire.

6. Name the portion of the city most likely to suffer from a large fire, giving boundaries of the district mentioned, and your reasons for thinking the district named peculiarly liable to danger.

### Laws and Ordinances.

1. By whom and under what authority are fire alarm and telegraph signal stations fixed and designated? Under this authority what other powers are vested in the person so authorized with reference to such alarm stations, etc., and what are the restrictions as to the use and the persons allowed to make use of such stations, telegraphs, etc.?

2. What suits and actions may be brought in the interest of the department? By whom are they bought, and by whom conducted?

3. To what penalties and fines are uniformed members of the department subject for infraction of the rules? For what other offenses than violation of the rules may such a member be punished by the Commissioner?

4. What restrictions are placed upon the Commissioner as to the dismissal of members from the force?

5. Give the substance of the law with reference to the obstruction of fire hydrants.

6. Is it ever lawful to destroy buildings by the use of explosives? If so, under what circumstances, and under what authority?

7. You are off duty and in citizen's dress. You see some boys on election night building bonfires with barrels, shavings collected from a carpenter's shop after nightfall, etc. *What is your duty?*

8. A fireman is injured at a fire through the failure of a tenant of a building properly to close his hoistways and iron shutters. What legal liabilities ensue, how are they determined, and what disposition is made of moneys recovered in such case?

9. What right of search is given to the Fire Department or its officers?

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## Assistant Foreman Fire Department.

### Dictation.

At the same time of the organization of the Commission its requirements could not be definitely ascertained, as the extent of its works could not then be determined. It was practicable, therefore, to grant specific appropriations for its force of employees or for suitable accommodations and supplies. As the work of the Commission has developed, Congress has from time to time increased the number of its employees. However, it is still necessary to secure details of employees from the several departments in order to transact the work of the Commission with any degree of promptitude.

### Laws and Ordinances.

1. Give the titles attached to the several ranks and grades of the officers and members of the uniformed force of the Fire Department, also a brief description of the insignia worn to indicate each rank.

2. What prevents any person not a member of the Fire Department from wearing the uniform and doing acts which firemen are authorized to do?

3. How is the storage of cotton, hay, and other vegetable products regulated in the City of New York?

4. Have the officers and agents of the Fire Department any right to enter private dwellings, buildings, and places of business in the City of New York, and if so, when and for what purpose?

5. Suppose you are off duty and are attending a performance at the Broadway Theatre, where the house is crowded, and you observe that persons are allowed to stand and sit in the aisles; what would you do?

6. Suppose you are in command of your company, and after putting out a fire you discover some partly burned shavings and a smell of kerosene under a stairway; what would you do?

7. When and under what circumstances must a pension be paid to the widow or relatives of a deceased member of the force?

## LOCALITIES.

(Take I. or II.; not both nor parts of both.)

### I. Manhattan and the Bronx.

1. Name two large stables, and describe their construction from a fireman's point of view.

2. Taking a Columbus avenue car at the Battery and proceeding thence to 125th street, and there exchanging for a Third avenue car and proceeding to Fort George, indicate the points at which your route would be intersected by streets or avenues running north and south.

3. From the last-named stopping-point how would you proceed to the office of the President of the Borough of the Bronx?

4. Name all crosstown streets in Borough of Manhattan occupied by street-car lines, or parts of lines, with the names *of such lines.*

5. *(a) Locate* the following buildings: (1) Broadway Cen

tral Hotel, (2) Garrick Theatre, (3) Steinway's Piano Warerooms, (4) St. Luke's Hospital. (*b*) Name and locate the companies that would be called out by an alarm of fire at each of above named points.

6. Locate and name three large hotels within one block of Grand Central Station, and discuss the relative merits of each from a fireman's standpoint.

## II. Brooklyn and Queens.

1. What creeks form part of the boundary between Brooklyn and Queens?

2. Locate the bridges crossing Gowanus Canal and those crossing Newtown Creek.

3. If an alarm were sent in from Box 392 (Kent avenue and Ross street), what especially dangerous building would be indicated?

4. If a fire should break out in the varnish factory in Varet street, what would be the most expeditious route for Engine 121 to take in going to it?

5. What unusual difficulties would a fire in the neighborhood of Metropolitan avenue and Ten Eyck street present?

## Rules and Regulations.

1. What information appears upon the back of a report of company operations at a fire? Prepare a form showing how this information appears, assuming any facts you choose.

2. State in full the different leaves of absence a fireman may obtain, together with the regular manner of obtaining such leaves, and the record, if any, that is kept of the same.

3. Give in detail the duties of company commanders so *far as the horses* and their care are concerned.

*4. Relative to* inspection by company commanders, state:

*1. What inspection* is required of fire alarm boxes and

signs. 2. What inspection must be made in January and July of each year? 3. What inspection must be made as to special trades that require licenses? 4. Of what sorts of building inspections are made, and for what purpose? 5 What special funeral honors, if any, are given to a fireman killed in the discharge of his duty?

5. Assuming that you are made an inspector in accordance with one of the divisions of No. 4, write a report of such inspection, properly dated and addressed, and signed with your examination number.

## Departmental Inspector.

TECHNICAL.

1. What are the administrative departments of the city government?

2. State precisely and concisely the matters over which each has jurisdiction.

3. Does the Department of Finance make any inspection of the subway work of the Rapid Transit Commission? If so, what?

4. What is the general way in which supplies costing large amounts are obtained for the city?

5. What would, in your opinion, be the best method of inspection in such cases?

6. Suppose you were directed at this season of the year (April) to make an inspection of a large public park. To what points in particular would you give your attention?

7. For the proper inspection of what kinds of city works should you suppose an expert would be needed?

8. What kinds of inspection, in your opinion, may safely be left to men of good sense and intelligence without expert knowledge?

9. Assuming such facts as you please, write a report with recommendations of your inspection in Question 6, addressed to the proper official.

ARITHMETIC.

1. Add 1789658472; 2789346782; 9685746378; 6859683989; 1987654367; 3748593745; 3453456787; 9685746232; 5478323434; 1897861581; 1789658473; 1987653466; 7996885777; 9685748279.

2. *Multiply* 470.89 by 6.087.

3. *Divide* 30.23798 by 428.3.

4. Received $1912.50 to invest in wool. After reserving my commission of 2% how much did I pay for the wool?

5. Sold goods at 25, 16, and 5% off, and the discounts amounted to $722.70. Find the cost.

6. A speculator lost 12% of his money in one operation, and 15% of the remainder in another, and then had but $2431 remaining. What had he at first?

7. The interest for 3 years, 5 months, and 18 days, at 4½% was $292.50. What was the principal?

## Inspector, Bureau of Licenses, Mayor's Office, etc.

GENERAL.

1. What is junk? Dealers in what articles come under the title of junk-dealers?

2. Apart from bringing revenue to the city, why is it necessary that junk-dealers, dealers in second-hand articles, pawnbrokers, peddlers, hackmen, keepers of bowling alleys and billiard-rooms, and ticket speculators, should have licenses? Give specific reasons.

3. Besides the businesses mentioned in Question 2 what others must be licensed?

4. Why should a license to deal in second-hand goods be refused a pawnbroker?

5. Licenses of stands within stoop lines are prohibited from paying rent or other compensation to the owner of the premises where the stand is located. What is the reason for this prohibition?

6. What are the duties imposed upon keepers of bowling alleys and billiard-rooms?

7. Without confining yourself to the definition as given in the ordinance, what do you understand to come under the term of "common shows"?

8. What precautions would a prudent pawnbroker or dealer in second-hand goods take to satisfy himself that he was not dealing with a person offering stolen goods?

9. What is a coal-scalper; a peddler; a hawker; a vender; an exterior hoist?

10. Write a letter of not less than 250 words, properly dated, addressed, and signed, to some friend, giving your views upon the question whether the business of ticket speculation can or should be prohibited.

## Weighmaster.

### General Paper.

1. Without reference to good moral character or good health, what qualifications in your opinion would best fit a man for the position of weighmaster?

2. What kinds of coal are chiefly used in New York, and from where do they come?

3. Suppose an intent on the part of the dealer to cheat the city in (*a*) the quality (*b*) the quantity of coal delivered; state, 1st, what methods he would be likely to use in each case; 2d, what methods you would adopt to thwart him.

4. What inspection of scales would you advise and adopt?

5. Suppose that coal has to be delivered from a barge to a designated place by carts. State, 1st, what system of tickets or other checks on the driver you would consider the best to employ; 2d, what system of weighing carts you would consider best. Give reasons for your answers to both questions.

6. You find that there has been collusion between a contractor for furnishing coal and the authorized receiving agent. Assuming such facts as you please, write a report of the affair and your action therein, properly addressed and dated, and signed by your examination number and *not* your name.

### Arithmetic.

1. Add 198267892; 987554321; 129384756; 293148278; 1238967; 156734; 4999; 6784577; 86753; 1987762; 992788355; 289378467; 827956757; 234567893; 252637989; 968478236; 928374627; 789567345; 8279377; 978564; 928374625; 198765433.

2. A man buys 8497 tons of coal at $5 the long ton, and retails it at $6.50 the short ton. What amount does he gain, *and what per cent.?*

3. My gas meter registered, April 1st, 207,300 feet; the bill for January 1st showed 202,800 feet. What is the bill for gas for the three months at $1.80 per thousand feet, if 0.16⅔ of the bill is deducted for prompt payment?

4. In grading my lot, which is 100 feet square, I used the material dug from a cellar 60 ft. by 24 ft., and 8 ft. deep. What was the depth of the grading of the lot?

5. How many bricks, 22 per cubic foot, will it take to build a wall 38 feet long, 8 feet high, and 1¼ feet thick, allowing one-fifth of the wall for mortar?

## Supervisor of Public Baths.

DUTIES.

1-2. Draw up a set of rules such as you would consider proper (*a*) to post in the baths for the guidance of the public; (*b*) to give to the bath attendants for their guidance.

3. State, with precision, what you consider to be the necessary equipment of an average floating bath.

4. Give your opinion as to the proper structural arrangement of a bath where men and women are both admitted at the same time.

5. Suppose you are appointed to select a location for a floating bath. State fully, and with precision, what points you would take into consideration in making your selection.

6. Supposing you were appointed as in Question 5; write a report of your action, of your selection, and your grounds for it, assuming any facts you please.

This report must be addressed to the proper authority and signed with your examination number, and *not* your name.

7. State, precisely, your opinion as to the proper way of cleaning baths, and of keeping them clean.

8. What precautions should be taken in securing the careful and thorough cleansing of towels, etc.?

(Knowledge of arithmetic, grammar, and use of English is tested).

## Civil Service Examiner—Male.

GENERAL PAPER.

1. How, and by what general description of persons were the following States first settled: Massachusetts, Connecticut, New York, Maryland, Virginia, and Georgia?

2. How and when did the territory included in the States of Missouri and California become subject to the jurisdiction of the United States?

3. Name the States containing the following large cities respectively: Grand Rapids, Kansas City, Allegheny, Fort Wayne, Fall River, Oakland, Peoria, Duluth, Camden, Omaha.

4. (*a*) Name the counties in the city of New York. (*b*) State which of the following officers are county officers: Mayor, Comptroller, Sheriff, District Attorney, President of a Borough, President of the Board of Aldermen, Register. (*c*) In what county do the electors reside who elect the President of the Borough of the Bronx?

5. Is the rate of taxation in the city of New York the same each year? If it is not the same, state in a general way the method of fixing it each year. If it is the same, state when and how it is fixed.

6. What is Magna Charta? What is the Declaration of Independence? State briefly the political situations which produced each instrument and show wherein they are alike, if at all.

7. (*a*) What is the difference between the functions of the President of the United States and the functions of Congress? (*b*) What reason is there, when each State has a complete judiciary system, for the existence of United States Courts? (*c*) What peculiar power have our courts, *both State and Federal*, which the courts of most foreign *countries do not* possess?

8. State generally the character of examination which, in your opinion, should be prescribed for candidates for the positions of (*a*) bookkeeper, (*b*) inspector of elevators, (*c*) watchman.

9. Prepare in each case a list of five *general* questions (excluding arithmetic and spelling) to test the qualifications of a candidate for the position of (*a*) office boy, (*b*) bath attendant.

10. At a competitive examination the following answers were given by A and B, respectively, to the following questions in arithmetic. Rate the answers of each on the basis of 100 for a maximum, and state, briefly, your reasons for so doing.

1st Question:

A note of $1,200, dated February 13, 1891, due in 9 months, and bearing interest at 6%, was discounted in bank July 31, 1891, at 8%. What were the proceeds?

A

1200
.045½
600
6000
4800
54.6000 at 6%
1200.
1254.60 amt. with int.

1891 — 7 — 31
1891 — 2 — 13
5 — 18 time discounted
2) 5
.025
.003
.028

1200
.028
9600
2400
33600
8
6)268.800
44.80

$1254.60
44.80
$1209.80 proceeds.

(B)

1200
.037½
400
8400
3600
44.80

1891 — 7 — 31
1891 — 2 — 13
4 — 48
$1200
44.80
Ans. 1155.20

.02
.008
6).028
004⅔
8
5⅓
82
.0881⅓

2d Question:

A speculator invested 28% of his money in cotton, 45% of the remainder in pork, and with the balance bought 1,716 bushels of wheat at 75c. a bushel. How much did he pay for the pork?

(A)

1.00
.28 cotton
.72
.45
360
288
.3240 pork

.72
.3240
$3960 wheat
$3250
.824
13000
6500
9750
$1053.000

1716
.75
8580
12012
1287.00

$1287 = 39⅔%
3250 = 100%

.3960)1287.000.00)
1188 0
9900
7920
19800
19800

Ans. Cost of pork $1053.

(B)

28% cotton

1.00 total
.28
.72 rem.
.45 pork
.27 wheat

1716
.75
8580
12012
$1287.00 cost of wheat

1287 = 27%
1/27 of 1287

1287 47.66⅔ = 1%
27 )1287
108
207
189
180
162
18 6 ⅔
27 = 9 = ⅔

45
⅔
3)90
30

100
47⅔
3)200
66⅔
700
4000
4766⅔ = 10%
.45
23830
19064
2144.70
30.
$2174.70
Cost of pork.

11. At a competitive examination the following answers *were given by A* and B, respectively, to the following dictation *in spelling.* Rate the answers of each on the basis of *100 for a maximum,* indicating the errors:

(A) Incoherent, signalize, cognisant, imperturbable, determination, sentence, solvent, cashier, jeopardy, gorgeous, chancellor, customary, vicious, divinity, steadfast, journalism, brocade, gregarious, emancipation, fallacy, justification, amplified, trenchant, embarassment, subterranean.

(B) Incoherant, signalize, cognesant, impartardeble, determentaion, sentence, solvent, cashier, jepardy, geordius, chancilor, custimory, vicious, divinity, steadfast, journalism, brocade, brigerious, imancipation, falasy, justification, amplified, trenchant, embarisment, subterian.

12. Write a letter to the Chief Examiner stating in what respects, if any, the conduct of this examination, in your opinion, might be improved.

## Arithmetic.

1. Add 3861947; 7432386; 5674924; 9253856; 6937439; 5748295; 2529768; 4136372; 8765439; 8697081; 7586453; 2948675; 5465768; 4321043; 9293949; 2345678; 9999999.

2. (*a*) Multiply ninety-seven ten thousandths by four hundred and sixty-seven hundredths.

(*b*) Divide one hundred forty-seven and eight hundred twenty-eight thousandths by nine and seven tenths.

3. If $\frac{5}{8}$ of a ton of coal cost $10, what will 1 cwt. cost at the same rate?

4. A young man lost one fourth of his capital in speculation. He afterwards gained $500; his capital was then $1,250. What was the sum lost?

5. If the sun pass over one degree in 4 minutes, and it is 7 o'clock 4 min. and 7 sec. A.M. in New York when it is noon at Greenwich, what is the longitude of New York?

6. I sell cloth for $4.40 a yard, and thereby lose 12½%; I meant to gain 10%. What should have been the price?

7. *For how long* a time must $100 be loaned to produce *the same interest* as $150 in six months?

## Civil Service Examiner—Female.

GENERAL PAPER.

1. (*a*) What was the purpose of Spain, France, and England in settling the continent of North America? (*b*) What portions were settled by each nation? (*c*) How did their attitudes toward, and treatment of, their colonies differ?

2. What was the Missouri Compromise? State succinctly its history.

3. What additions were made to the territory of the United States as a result of the Spanish-American war of 1898?

4. Name the States containing the following large cities respectively: Erie, St. Joseph, Cambridge, Evansville, Des Moines, Seattle, Lowell, San Antonio, Dayton, Denver, Scranton.

5. (*a*) What are the functions of the Mayor of the City of New York? (*b*) State generally the process by which the money is appropriated, for example, to clean the streets. (*c*) Did any resident of the Borough of the Bronx vote for Mr. Jerome for District Attorney at the last election? Give the reason for your answer.

6. What is the difference between the power of Congress and (*a*) the power of the Parliament of England; (*b*) the power of the Legislature of the State of New York?

7. Why are Senators of the United States elected by the State Legislatures? In your opinion, is it wise to change this method of election? State succinctly your reasons for your opinion.

8. State generally the character of examination, which, in your opinion, should be prescribed for (*a*) stenographer; (*b*) *bookbinder; (c)* nurse.

*9. Prepare in* each case a list of five general questions (*excluding arithmetic* and spelling) to test the qualifications of

a candidate for the position of (*a*) messenger; (*b*) police matron.

10. At a competitive examination the following answers were given, respectively, by A and B to the following questions in arithmetic. Rate the answers of each on the basis of 100 for a maximum, and state briefly your reasons for so doing.

1st Question:

A note dated May 19, at 90 days, was discounted June 15 at 4% and $2.31 deducted. What was the face?

(A)

May 19 — May 31 leaves 12 days
June 1 — June 15 " 15 "
27 " left
27 days int. at 4% = $2.31
Int. on $1 for 27 days at 4% = $.0030
.0030)2.3100($770 face of note-answer.
2 10
210
210

(B) $2.31 = 4% 100% = $57.75 answer.
57¾ = 1%

2d Question:

I invested $7,840 in bonds at 2% discount, and sold them at 4% premium. Find my gain.

(A) $7840 = 98% cost of bonds.

.98)7840($8000 per value of bonds
784

$8000
1.02
16000
80000
$8160.00 selling price of bonds
7840. cost of bonds
$ 320. gain, answer.

(B) $7840 = 98%
98)7840(80
784

1% = 80
104% or selling price = 104
80
$8320

8320
7840
$480 gain

11. At a competitive examination the following answers were given by A and B, respectively, to the following dictation in spelling. Rate the answers of each on the basis of 100 for a maximum, indicating the errors:

(A) Diffidence, novelities, intercourse, peculiarity, necessitate, ridiculous, monstrosity, perquisities, accommodate, zelous, querilous, catastrophe, insurgent, increment, culminate, relyed, shapely, derivation, incriminate, imperceptible, degradition, atrocity, venerable, despitable, rapitatious.

(B) Diffidence, novelties, intercourse, peculiarity, necessitate, ridiculous, monstrosity, perquisites, accommodate, zealous, querulous, catastrophe, insurgent, increment, culminate, relied, shapely, derivation, incriminate, imperceptible, degradation, atrocity, venerable, despitable, rapacious.

12. Write a letter to the Chief Examiner, stating what you understand to be the duties of an examiner of the Civil Service Commission, and the qualifications most necessary for the position.

## ARITHMETIC.

1. Add 8706975; 92389786; 79879898; 1651378; 155389; 9690909; 8588965; 7878088; 9579896; 86588782; 28689776; 6746597; 7564839; 247954; 9799887; 675743; 78737465.

2. (*a*) What will be the cost of $3\frac{5}{8}$ bales of cloth, each bail containing 36.75 yards, at 85c. per yard?

(*b*) Divide eighty-seven ten thousandths by three hundred fifty-twhundred thousandths.

3. How many tiles 8 inches square will cover a floor 18 feet long and 12 feet wide?

4. If a hogshead of molasses containing 120 gallons cost $30, and 20 gallons be lost from leakage, for what price per gallon must the remainder be sold to realize a profit of 33⅓% on the cost?

5. If sound travels at the rate of 1142 feet in 1 second

and 10 seconds elapse between seeing the flash of a gun and hearing its report, how many miles distant is the gun?

6. If $93.82 principal and interest be received from a loan of $85 for 18 months and 12 days, what is the rate per cent. per annum?

7. If 24 men in 4 days earn $288, how much will 36 men earn in 3 days?

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## Character Examiner—Civil Service.

### Duties.

1. What are the four classes in which the offices and positions in the classified service are arranged?

2. What positions are comprised in the unclassified service?

3. What information must be set forth in the formal application which an intending competitor is required to file in the office of the Municipal Civil Service Commission?

4. What preferences are allowed honorably discharged soldiers, sailors, and marines from the army and navy of the United States in the late Civil War?

5. For what causes may the Municipal Commission refuse to examine an applicant?

6. How may the general character of an applicant be ascertained, and upon whom rests the burden of proof of good character?

7. Where a candidate has been examined and a satisfactory report of the answers of the persons who have given recommendations upon his application paper has not been made by the character examiner, what action must be taken by the secretary?

*8. A candidate* files an application for permission to enter *an examination.* A letter subsequently received from or

some time, more heat is applied to tubes B.B.B. . . . than to tubes A.A.A. . . . What is then the direction of circulation in tubes A.A.A. . . . ?

9. (*a*) About what should be the economical evaporation of one pound of coal in the best type of boilers? (*b*) About what should be the grate area to heating surface in a stationary boiler? (*c*) What should be the ratio of heating surface to horse-power?

10. (*a*) Describe a "Cantilever Beam." (*b*) What is meant by the "efficiency of a riveted joint"? (*c*) In calculating the strength of a cylinder, what difference is made if the cylinder is considered as "thick" or as "thin"?

11. State all the requirements and precautions to be observed in introducing into a building a system of wiring for electric lights, so as to make a safe and durable job. Begin with the introduction of the wire through the wall, this entrance being above ground, so as to make it secure from short circuiting, and give everything required to and including the attachments to the fixtures.

12. When the load on an electric lighting system becomes too heavy for the dynamos in use, describe clearly the operation of switching in another dynamo. State what troubles may arise if this is not properly done.

13. Describe the apparatus by means of which an alternating current may be changed to a direct one; also the apparatus for changing a direct to an alternating current.

14. (*a*) Describe as far as you can the different devices in use for preventing accidents to elevators, either from overwinding or from breakage of parts. (*b*) Describe whatever inspection of such parts you would think necessary after use.

## MATHEMATICS.

*1. In a hydraulic* press, a work of one-fourth a horse-*power is applied* to the small piston. The diameter of the

large piston is twelve (12) inches, and it moves half an inch per minute. Find the pressure per square inch in the fluid.

2. A man walking along a straight road at the rate of three miles an hour sees in front of him at an elevation of 60° a balloon, which is traveling horizontally in the same direction at the rate of six miles an hour; ten minutes afterward he observes that the elevation is 30°. Prove that the height of the balloon above the road is 440 $\sqrt{3}$ yards.

3. (*a*) In a steam-boiler which is 40 inches in diameter and shell $\frac{1}{2}$ inch thick, with a steam-pressure of 80 lbs., what will be the strain per square inch on a longitudinal section of the shell? Also on a transverse section?

(*b*) Calculate the horse-power of a 24 + 48-inch engine running 70 revolutions, average pressure in cylinders 40 pounds.

4. A double cylinder hoisting-engine uses steam at an average cylinder pressure of 60 lbs. per inch, when cutting off at full stroke. The cylinders are 5 inches in diameter, and have a 12-inch stroke. The crank shaft carries a 5-inch (on pitch circle) pinion, gearing into a 12½-inch shell on an intermediate shaft. On the intermediate shaft is a 5-inch pinion gearing into a 22½-inch wheel on the shaft carrying the drum, and the drum is 14 inches in diameter. Assuming 100 revolutions per minute, and neglecting all frictional or other losses, what weight can be hoisted, and what would be the speed of hoisting?

# Books for Candidates for Service Examinations.

**Handbook on Sanitation.**

A Manual of Theoretical and Practical Sanitation. For St Physicians; for Health, Sanitary, Tenement-house, Plumbin; Food, and Other Inspectors; as well as for Candidates for al Sanitary Positions. By GEORGE M. PRICE, M.D., Medical S spector, Department of Health, New York City, etc. 12mc pages, 31 figures. Cloth, $1.50, *net*.

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